FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1121. (Vol. XXII. No. 25.) JUNE 20, 1930 [Weekly, Price 6d. Post free, 7½d. Abroad, 8d.

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telephone: Editorial, Holborn 1884. Advertising, Holborn 3211
Telegrams: Truditur, Westcent, London.

Annual Subscription Rates, Post Free.

United Kingdom .. 30*s.* 4*d.* Abroad .. .. 33*s.* 0*d.**

* *Foreign subscriptions must be remitted in British currency.* (*See last Editorial Page.*)

CONTENTS

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1930

June 20 .. Andover Air Display.
June 20 .. Entries close for Circuit of Italy.
June 21 .. Household Brigade Flying Club Meeting at Heston.
June 21 .. Air Rallye at Haldon Aerodrome, Teignmouth.
June 26 .. Ipswich Air Pageant.
June 27 .. R.A.F. Dinner Club Annual Dinner.
June 28 .. Royal Air Force Display, Hendon.
June 28-July 5 Brighton Air Week.
July 5 .. King's Cup Race and Hanworth Air Pageant.
July 9-12 .. R.A.F. Athletic Championships, Uxbridge.
July 17-23 "British Week" at Antwerp Exhibition.
July 19 .. N.F.S. Flying Meeting, Leeds.
July 19 .. N.F.S. Flying Meeting, Hull.
July 19 .. Air Pageant at Hanworth, in Aid of National Birthday Trust Fund.
July 20-Aug. 7 International Light 'Plane Tour of Europe, starting from Berlin.
July 26 .. Norwich Flying Meeting.
July 31 .. Entries close for 1931 Schneider Trophy Contest.
Aug. 15-31 Circuit of Italy.
Sept. 1-6 5th International Air Congress at The Hague.
Sept. 6 .. Opening of Ratcliffe Aerodrome, Leicester.
Sept. 6-28 Aero Exhibition, Stockholm, Sweden.
Sept. 20 .. Liverpool Air Pageant.
Sept. 27 .. N.F.S. Air Meeting, Hanworth.
Nov. 28-Dec. 14 Paris Aero Show
1932
May 31 .. Closing date for Cellon Cross-Channel Glide £1,000 Prize.

EDITORIAL COMMENT

THE visit to Cardington, on June 17, of Mr. Fred M. Harpham, a Director of the Goodyear Zeppelin Corporation, was certainly an event of some interest. Mr. Harpham is not a technical man, but a company director. Until he embarked on the "Graf Zeppelin" and crossed from Lakehurst to Friedrichshafen, he had never been up in a large rigid airship, though he had flown much in non-rigids and in aeroplanes. His opinion, therefore, is not that of a zealot so wedded to his pet type of craft that in his eyes it can have no fault, but represents rather the lay sentiments of America, which have come to believe that the possibilities of airships deserve exploration by business men.

A Tribute from the U.S.A.

It was Mr. Harpham's fate to meet some London journalists who spoke of R 100 and R 101 as "our two white elephants." Mr. Harpham very courteously but very firmly took exception to the phrase. He expressed a natural surprise that some of the papers of Great Britain did not appreciate British progress in the matter of airships. In America, he said, they felt that the British had made a distinct and great contribution to the art of airship development. He used the word "art," he said, because airships were such a new thing in transportation. "Compare," he exclaimed, "the time spent on the development of steamships with the time spent on the development of airships." The world, he said, was too impatient, and demanded too fast a progress in the development of airships. The British contribution, so far, was to have designed two distinct types. Their strength factors, on account of their shape, were beyond anything yet produced. The British were the first to use a Diesel engine in an airship. The Goodyear Corporation was not yet ready to do that. In the 6,500,000 cub. ft. naval airship "Akron," now building, Diesel engines could not be installed, though he hoped that they would be ready for the second airship. The Diesel was undoubtedly the airship engine of the future. He was also impressed by the

British system of housing the passengers inside the hull. Finally, Mr. Harpham congratulated the British nation on having pushed on with research and experiment, instead of leaving it to other nations to bear the burden and heat of the day.

These remarks are no light compliments ; and they become still more impressive when one considers the attitude towards airships adopted by business circles in the United States. Mr. Harpham explained that though the two present airships on order are for the U.S. Navy, his Corporation was organising two companies to operate airships, one across the Pacific, and one across the Atlantic. On the boards of these companies were representatives of the three chief trans-Pacific steamship companies, three trans-continental aeroplane companies, and various leading railway companies. This showed that all these interests regarded airships, not as potential rivals, but as potential allies. These two companies would explore questions of possible profits. They would study cost of construction, cost of operation, pay-load, and similar questions. The chances of commercial profit, said Mr. Harpham, demanded first study, and then, in all probability, experiment. As regards the comfort of airship travel, Mr. Harpham said that his 54 hours on the " Graf Zeppelin " were unquestionably the most comfortable hours he had ever spent in travel.

It seems to us that this opinion from America ought to weigh heavily with the British press and the British public. Not long ago, Lord Thomson, in the House of Lords, said that the airship programme had not received much support from the general press, except perhaps from *The Times*, *The Daily Telegraph*, and *The Manchester Guardian*. These three journals certainly represent a solid block of weighty opinion ; but it seems to us a matter for regret that what is called the popular press should not have seen cause for legitimate pride in this example of British enterprise. Had Great Britain stood aside and waited for the results of the experiments in Germany and the United States, her attitude would not, to say the least of it, have been dignified. The position, when our airship programme was undertaken, was that there seemed a fair, and even a good, chance of obtaining a unique and very valuable means of transport and communication, which would be especially useful to the British Empire, provided that experiments on a somewhat large scale were undertaken. The building of small rigid airships would have been futile. The lesson could only be learnt from ships of not less than 5,000,000 cubic feet capacity. Expenditure was called for which only a national purse could be expected to bear. But the rewards of success would be of such great benefit to the British Empire that to have abstained from spending this money would have been most reprehensible. For instance, there seems at present no prospect of providing rapid transport between Canada and Great Britain so conveniently as by airship. The case of Canada alone justifies the whole expenditure. The United States can look for no equivalent political gain from the success of airships ; but the chances of financial profit have drawn steamship, railway, and airway companies to share in the airship experiments. That is an impressive fact.

Where, it may be asked, do we stand now ? On the technical side, the greater part of the case for airships has been made good. The " Graf Zeppelin " has done very well in the air ; but at the more searching test of riding at the tower head R 101 has done even better. We may accept the safety of a soundly designed, soundly built, and soundly handled airship as proved. An airship which fails in any of those respects may, of course, come to grief, even as in similar case a steamship or a train may meet with disaster. Such a mishap would not now disprove the case for the airship. We must always bear in mind that all airships now in existence or building are experimental. No one ship yet embodies all the features which experience has shown to be desirable.

There remains the question of commercial profit. There we must agree with Mr. Harpham that study and experiment are still necessary. The airship stands now in about the same position as the aeroplane stood in 1919. We then started aeroplane services and ran them at a loss, but we do not now regret our enterprise. We must certainly be prepared to do no less with airships.

THE R.A.F. DISPLAY

THE Royal Air Force Display at Hendon on Saturday, June 28, promises to attract larger crowds than ever. Perhaps the King and Queen will be there, but in any case several members of the Royal Family will be present. All the four sons of the King are keenly interested in flying, though only the Duke of York has won his " wings." The programme will certainly be as attractive as ever. It would be safe to say that if the whole programme were absolutely identical with that of last year it would give complete satisfaction to all the spectators. If the display lasted for a week each year, there are many thousands who would go again and again to see it.

But, alas, the enemy's stronghold is no phœnix to rise from its ashes in a night. It is only once a year that people can see that glorious flare-up as the bombers attack and destroy it.

It is only once a year that they can watch the aerobatics of the service's crack pilots in Gamecock fighters ; the air drill of whole wings of bombers and fighters ; air combats with machine guns cracking and the defeated aeroplanes writhing down to earth in harmless flames ; the polished evolutions of the Moths of the Central Flying School ; the calculated clowning of the crazy Avros ; an attack on a camp by ship-fighters ; the flaring trails of coloured smoke ; and many other delights, any one of which by itself would be well worth a picnic at Hendon.

This year one item will be included which will give special pleasure. The airship R 101 will fly over the aerodrome during the afternoon. At present the population of the British Isles is divided into two classes, those who have seen one of the two new airships, and those who have not. The former class is mightily pleased with itself ; the latter wears a *semi-permanent* jaundiced complexion. No doubt by the evening of June 28 a good few thousands of healthy British citizens will have dropped that yellow hue, resumed their normal ruddy glow, and added thereto the gratified smile of those who have seen R 101.

One word more. For the sake of one's own comfort it is well to reach Hendon early. In addition, the flying events of the morning are all far too good to miss. We would also draw attention to an Air Ministry Notice to Airmen which states that in view of the large number of Service aircraft employed at Hendon from June 25 to 29, civil aircraft are warned against landing at this aerodrome on these dates. Pilots are also warned to keep a sharp look-out for Service aircraft taking part in races over a course lying approximately over Harrow-on-the-Hill—Elstree—Chipping Barnet—Hornsey—Harrow.

VINCENNES

Two Days' National Aviation Meeting

LAST week we made brief reference to the two days' aviation meeting held at Vincennes on Whit-Sunday and Monday. We are now able to give fuller details of this meeting from our correspondent on the spot.

Favoured with perfect weather, with the exception of a strong breeze blowing across the field, the first of the two "Journees Nationales de l'Aviation" (National Aviation Days) began last Sunday at the Vincennes Polygon. This meeting was strictly national in character, the entries being limited to French pilots and machines.

The historic Vincennes Polygon, situated just outside of Paris, which is an immense level sandy plain frequently used for military manœuvres, had been carefully prepared for the occasion. Stands were erected around on the field on all sides, the official tribune (grand stand) being constructed at the south-westerly end. The crowds began to gather in the morning and the close proximity to Paris, combined with excellent transit facilities attracted an enormous attendance. It is estimated that more than 300,000 people passed through the gates on Sunday and Monday, the two days of the meeting.

The management was excellent. Loud speakers were installed all around the field and the crowd kept well informed of all passing events. The programme, which was varied and especially full in the afternoons of each day was executed on schedule time. There was a large participation of both military and commercial planes, many of the aviation regiments and practically all the leading French civilian pilots taking part.

The military manœuvres, executed by regiments of the French Air Force flying in formation, then breaking their lines and again reforming them, were carried out with clocklike regularity. The stunt flying was especially good and thrilled the crowd, who frequently applauded. The "take off" of the tourist planes in their race to Bordeaux and return, the parade of the new planes, 1930 models, the arrival of the Belgian three-engined Fokker (230 h.p. "Tritan) plane loaded with fresh flowers, which were distributed in the grand stand, were also among the events which kept up the interest of the crowd from start to finish. It was one of the most successful meetings that have been held in France.

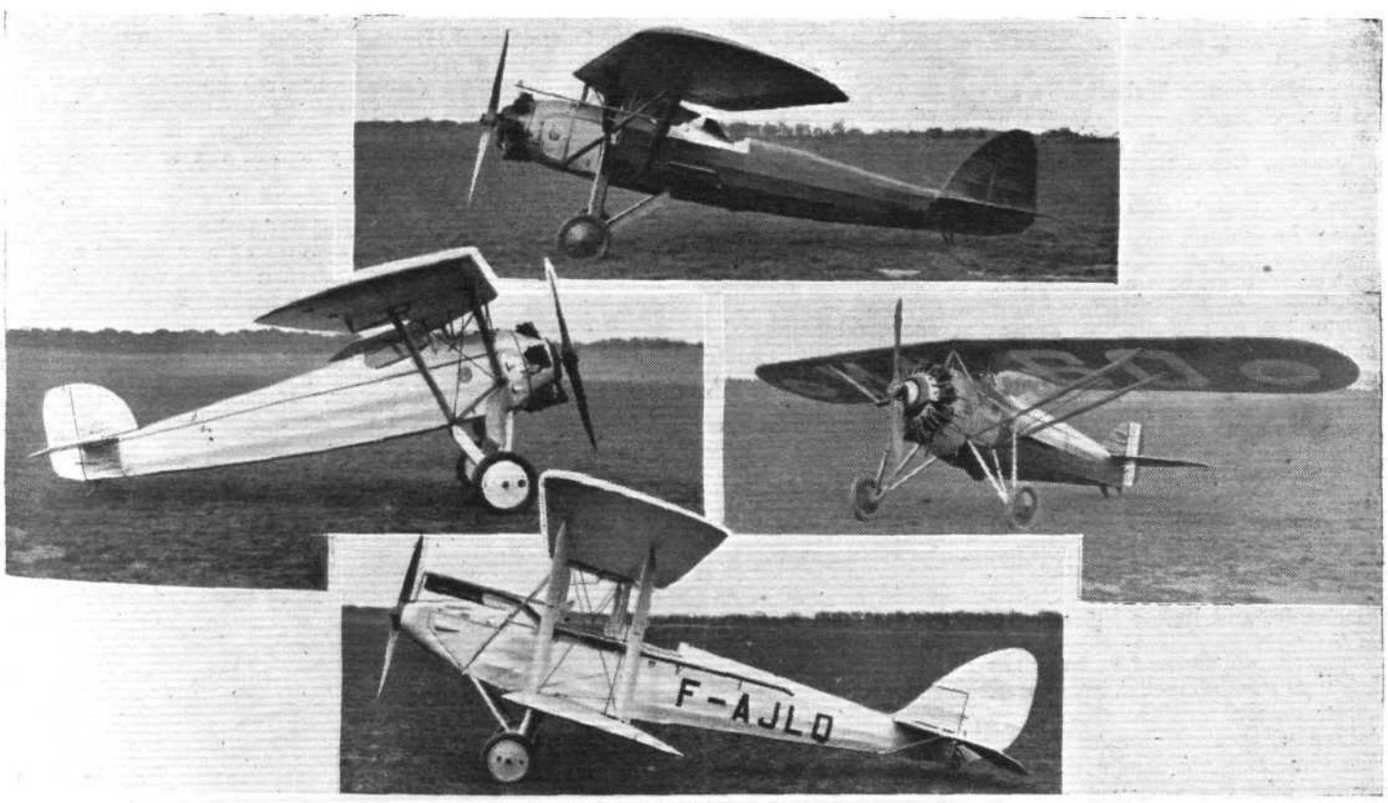
The first event was a military competition, termed "Passage à la Verticale," which took place at 9 o'clock Sunday morning. Two squadrons consisting of five 'planes each, from the 21st and 22nd Regiments respectively, were the contestants. These squadrons were composed of LeO (Liore and Olivier), type 20, night bombing planes, equipped with "Jupiter" 420 h.p. air-cooled engines. The competition consisted of a "climb," in close group formation, over a given point. First and second prizes consisting of art objects were offered by the Aero Club of France. The 22nd Regiment squadron was declared the winner by a jury, of which General Fequant was the chairman.

There was also a similar competition for day bombing 'planes for which squadrons from the 11th and 12th Regiments were entered. These were composed of Breguet, type 19, 'planes equipped with Renault 480 h.p. and 550 h.p. engines and with Lorraine 450 h.p. engines respectively. The 11th Regiment was declared the winner.

The next event on the Sunday morning programme was "Artillery Spotting" competition. The following two-seater observation planes were entered from different regiments :—Potez, type 25s, equipped with Lorraine 450 h.p. or 400 h.p. engines, or with 500 h.p. Salmsons ; Breguet, type 19, planes equipped with Renault 480 h.p. or with Lorraine 400 h.p. engines. The observer was supposed to get his range and aim at a given point of ground. At his signal of "fire" a fuse was set off on the ground at the point where he was supposed to aim at. The observer, through his instruments in the plane, could then check up his accuracy. Prizes were awarded by the Aero Club of France.

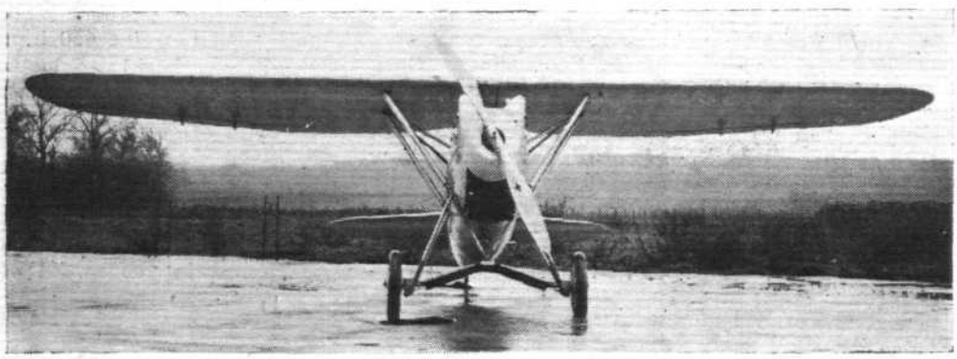
There were six entries in this competition from various aviation regiments, which were classed in the award of prizes as follows :—The 34th Regiment first, the 31st Regiment second, the 38th Regiment third, and the 32nd Regiment fourth.

In the Aviatrix Race, Miss Lena Bernstein was the only entry. Flying a Farman, type 190, equipped with a 230 h.p. Salmson, Miss Bernstein covered the course—Vincennes-



AT VINCENNES : **Four Morane-Saulnier machines ; At the top is the type 300 two-seater (tandem) training 'bus fitted with a 95 h.p. Salmson. On the left is another training machine, type 181, with a 60 h.p. Salmson. The type 230 (230 h.p. Salmson) is shown on the right, and was flown by Detroyat. The fourth machine is the familiar "Moth" (with "Gipsy" engine), for which the Morane-Saulnier firm has acquired the French rights.**

AT VINCENNES : The Liore & Olivier, LeO 25, Bn 4, a twin-engined all-metal bomber.



This is a Dewoitine D 27 Pursuit 'plane (500 Hispano-Suiza) constructed by the Liore & Olivier firm, which was flown by Doret.

Etampes and return—a distance of 65 miles, in about 52 mins.

Two Belgian St. Hubert light tourist planes, equipped with 85 h.p. Walter engines, arrived at Vincennes from Brussels on Sunday morning. After attending the meeting in the afternoon, the Belgian airmen returned to Brussels that evening.

The various 'planes entered in the meeting were ranged along the easterly side of the Polygon, in front of the official tribune (grand stand). They comprised types of all kinds and sizes, both past and modern. Among the new models exhibited—most of which we illustrate—were :—

The Farman, type 300, known as the "Silver Star," a three-motor commercial monoplane, equipped with "Titan" or Salmson 230 h.p. radial air-cooled engines. This plane carrying a commercial load of 2,000 lb., can "take off" and climb to 10,000 ft. with only two motors in operation (one motor stopped). It can be manœuvred with one aileron taken off. This new Farman 'plane has a maximum speed of 150 m.p.h. and a cruising speed of 120 m.p.h. It accommodates eight passengers, together with the pilot and mechanic, and has a flight radius of 7 hr.

The Breguet, type 270, known as the "all steel plane," a two-seater, single motor, military observation 'plane of the well known Breguet sesquiplane type. The upper wing is of the semi-thick profile and the lower wing, which has a much reduced spread, is of thick profile construction. The wings are braced together by two struts mounted in V-form, the apex being fastened to the lower wing. This plane is constructed with a fuselage simply long enough to accommodate the motor and the seats of the pilot and observer. It then terminates and the empennage is joined to the rest of the fuselage by a steel beam. The machine is of steel construction throughout and the wings and fuselage are covered with sheet duralumin. It is equipped with a 500 h.p. Hispano-Suiza, and has a maximum speed of 152 m.p.h.

The Dewoitine Pursuit 'plane D 27, the latest addition to this well-known make, constructed entirely of duralumin. This machine was flown by Doret during the meeting, who performed some especially well executed manœuvres. It has a speed of 182 m.p.h. and handles very easily. It is equipped with a 500 h.p. Hispano-Suiza motor.

The Dewoitine D 35, a new commercial transport monoplane equipped with a Wright Hispano-Suiza 300 h.p. air-cooled radial motor. This machine has an especially large roomy cabin which will accommodate four persons together with the pilot. It has a speed of 130 m.p.h. It is constructed entirely of duralumin with wings of the semi-thick profile Dewoitine type.

The Liore and Olivier, LeO 25, Bn 4, a two-motor military bombing 'plane also constructed of duralumin. It is equipped with two 500 to 600 h.p. engines of any of the standard French makes. It has an undercarriage of especially strong construction for landing on rough fields. It has a maximum speed of 120 m.p.h.

The Bleriot III, a commercial transport low semi-thick wing monoplane, equipped with a "Jupiter Titan" or other standard 230-250 h.p. motor. It accommodates four passengers and the pilot, and has a maximum speed of 119

A SERVICE MACHINE AT VINCENNES : The Breguet 270 all-metal military observation 'plane (600 h.p. Hispano-Suiza). Note the abbreviated fuselage and method of carrying the tailplanes.

COMMERCIAL MACHINES AT VINCENNES : **The Farman F 300 "Silver Star" 8-passenger monoplane with three 230 h.p. "Titans."**

m.p.h. with a crusing speed of 105 m.p.h.

The Morane-Saulnier, type 230, single engined two-seater parasol type monoplane, equipped with a 230 h.p. Salmson motor. It is largely used for training pursuit pilots. This machine won the 1929 Michelin Cup (tour of France), piloted by Detroyat.

The Morane-Saulnier "*Jockey*" 223, new single-seater pursuit 'plane equipped with a "Jupiter" air-cooled 500 h.p. motor, type VII, fitted with a supercharger. Winner of the George Dreyfus Climbing Prize, awarded at the 1929 Vincennes Meeting. Several improvements have been made in the 1930 model of this plane, notably a new undercarriage and a new form of stream-lined struts. Speed at 5,000 m. (16,000 ft.), 175 m.p.h.

The Dewoitine D 35, a 4-passenger transport monoplane, equipped with a 300 h.p. Wright-Hispano.

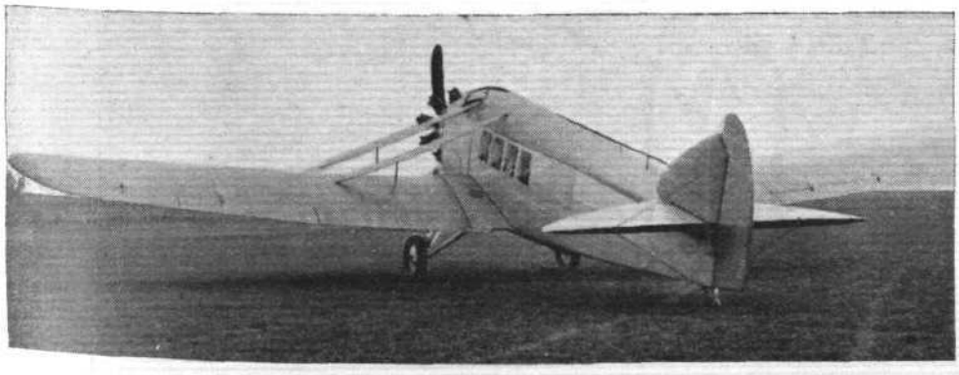
Other 'planes ranged in front of the official grand stand included a Potez 39, a new two-seater military observation 'plane of metal construction, equipped with a 500 h.p. Hispano-Suiza motor, a Gourdou-Leseurre monoplane, fitted with a caterpillar tractor landing gear for use on African sands and similar places, a Wibault Observation 'plane, equipped with two 420 h.p. "Jupiters," and a Morane-Saulnier-built two-seater tourist "Moth," for which they have acquired the French licence.

The early types of 'planes used by Henry Farman, Louis Bleriot, and other pioneers, were also on exhibition, and made several flights.

The Air Minister, M. Laurent Eynac, accompanied by M. Pierre Etienne Flandin, President of the Aero Club of France and Minister of Commerce, made an inspection of these 'planes on Sunday morning. They passed in front of each of them and conversed with the various constructors, engineers, pilots, etc. M. Gaston Doumergue, the President of the Republic, also made a similar inspection on Sunday afternoon, after his arrival about 3 o'clock. He was accompanied by MM. Laurent Eynac and Pierre Etienne Flandin and their staffs.

Among those who accompanied the President of the Republic and the Ministers on their tours of inspection were noted, Marshal Franchet d'Esperey, Generals Niessel, Barres, Hergault, de Goys, Poli Marchetti, Admiral Estiva Vergniette, M. Caquot, Directeur General Technique of the Air Ministry, M. Rudolph Sorreau and Paul Tissandier, Vice-Presidents of the Aero Club of France, M. Gabriel Amand, Commissaire General of the Meeting.

The other aeronautical personalities present included Air Marshal Sir Sefton Brancker, Air Commodore Bone, British Air Attaché at Paris ; Col. O'Gorman, the Chairman of the British delegation to the F.A.I. (Fédération Aéronautique Internationale), which took place that week in Paris ; Maj. Darwin, also of the British Air Force ; Harold Perrin, Secretary of the Royal Aero Club ; Maj. R. L. Walsh, the United States Military Air Attaché ; and Commander W. M. Thomas, the United States Naval Air Attaché at Paris ; Mr. Sidney B. Veit and R. C. Wood of the National Aeronautic Association of America ; General Rudeano and Colonel Negresco, of the Roumanian Air Force ; Mr. John J. Ide, of the U.S. Advisory Committee of Aeronautics ; Godfrey L. Cabot, a



ANOTHER COMMERCIAL MACHINE AT VINCENNES : **The Bleriot III, a low-wing transport monoplane with a 230 h.p. "Titan."**

former President of the Naval Aeronautic Association of America.

The first event, Sunday afternoon, was a Race for Tourists Planes to Bordeaux and return. A distance (one way) of 1,008 kilometres (630 miles). Under the regulations the planes were required to arrive at Bordeaux the same day and then to leave on Monday, arriving at Vincennes during the second day of the Meeting.

This race was open to four categories of tourist 'planes. *1st Category*, single seater 'planes of a weight, empty, of 770 lb. maximum; *2nd Category*, two-seater 'planes of a weight, empty, of 880 lb. maximum; *3rd Category*, two-seater 'planes of a nominal power of 200 h.p. maximum; *4th Category*, 'planes of a nominal power between 200 to 300 h.p. inclusive, carrying at least 4 passengers in addition to the pilot.

The Bleriot Spad G 2 training or tourist two-seater, fitted with a 230 h.p. Salmson.

Four entries started for this event, viz.:—

1st category, Reservat in an Albert 'plane, 40 h.p. Salmson; *2nd category*, Armand Lotti in a Potez 36 cabin monoplane 95 h.p. Salmson, and Jean Assolant in a similar 'plane; *4th category*, Ferdinand Lasne in a Nieuport Delage cabin biplane, type 641, equipped with a 230 h.p. Lorraine.

Owing to the very bad visibility in the vicinity of Bordeaux Sunday afternoon, only Reservat succeeded in reaching that city. The other contestants were obliged to land on the way and did not reach Bordeaux. All the competitors returned to Vincennes the next day (Monday), but Reservat was the only one to qualify, he alone having reached Bordeaux within the time required.

The other events in the afternoons of both days included stunt flying by the well-known pilots, Lemoigne on his Gourdou-Leseurre monoplane (420 h.p. "Jupiter"), Marcel Doret on his Dewoitine, D 27 (500 h.p. Hispano-Suiza), Michel Detroyat on his Morane Saulnier, type 222 (380 h.p. "Jupiter"), and Rene Paulhan on his Nieuport, type 62 (500 h.p. Hispano-Suiza).

These pilots performed barrel rolls, loopings, side slippings, flying upside down, fish tails and other stunts that brought repeated applause from the crowd. They also competed in a balloon "punching" contest, which was also greatly admired.

The Bernhard monoplane, the *Yellow Bird*, that was used by Assolant, Lotti and Lefevre in their transatlantic flight, flew over the field. This 'plane is now the property of the French Government. The big 28-passenger, 3-motor Dyle and Baccalan transport 'plane of metallic construction, equipped with 600 h.p. Hispano-Suiza motors, and Costes and Bellonte in their Breguet (650 h.p. Hispano-Suiza) Sesquiplan *Question Mark*, also encircled the field on both days. It is reported that Costes is rapidly completing his tests and expects to shortly start for New York.

Among the other interesting features of the meeting was the arrival of mail from Morocco in an Aeropostale Late 28 'plane. This postal matter was rapidly transferred to waiting Farman and Air Union 'planes for re-expedition to England and Belgium. A postal automobile was also on hand to take the mail immediately to Paris.

One of the most interesting events of the meeting, however, was when toward 5 o'clock on each of the days, punctually to the time announced, a veritable cloud of 'planes appeared on the horizon. Flying in perfect formation, in groups of 5, of 7, and of 9 'planes each, the 34th Aviation Regiment from le Bourget loomed into view and passed over the field. This regiment was composed of Nieuport, type 62 pursuit 'planes, equipped with 500 h.p. Hispano-Suiza motors and of Breguet observation 'planes, type 19. (400 h.p. Lorraine.)

The 11th Aviation Regiment followed closely, composed of Bleriot, type 127, two-engined combat 'planes with 500 h.p. Hispano-Suiza motors, and Breguet observation 'planes (550 h.p. Renault). The 12th Aviation Regiment composed, of Breguet observation 'planes also formed part of the fleet. The order was rigidly maintained throughout and the 'planes disappeared from view in as perfect formation as when they first appeared in sight.

Evolutions by a group of pursuit 'planes was also exceedingly well executed. all the formations being gone through with great precision.

The meeting closed with a "smoke screen" being dropped in front of a "beleaguered desert post," erected in the extreme end of the field, to which 'planes then dropped provisions. These manœuvres were also carried out with perfect precision.

R. C. W.

◈ ◈ ◈ ◈

8936

FOR THE R.A.F. DISPLAY: A batch of "Gipsy-Moths" ready for delivery. They will figure in some of the events at Hendon on June 28. (FLIGHT *Photo.*)

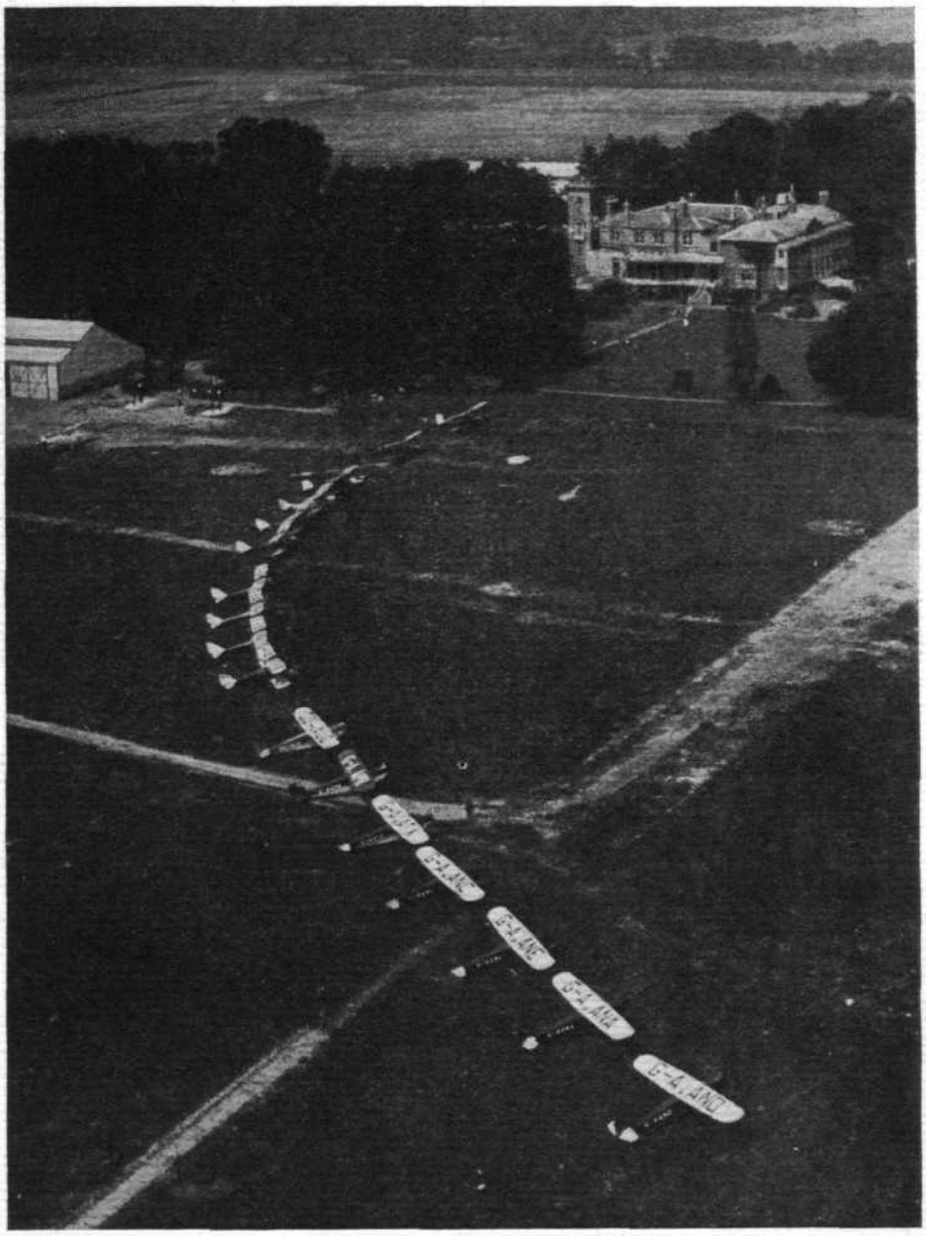
A HANWORTH OCCASION

ON Saturday last, June 14, Lord Brentford or "Jix" as he is still more familiarly known, visited Hanworth Park and laid his blessing on the taxi service which N.F.S. have built up in the past few months, and which has steadily grown, until to-day it has become a really big business which is constantly and regularly used by many well known and influential business men not only in this country, but also from the Continent.

After taking lunch in the Club house the party moved out to the aerodrome where many machines were drawn up for inspection. Lord Brentford was first introduced by Sqd.-Ldr. the Hon. F. E. Guest, who is the chairman of N.F.S., and in welcoming him to the club on this occasion he said that he felt that Lord Brentford was so to speak the "Peter Pan" of aviation or more correctly of modern progressive transportation, and as such no one was more fitted to come to the club on that day and encourage them by so doing.

Lord Brentford in reply said that it pleased him very much indeed to come down to Hanworth and assist on such an occasion as he felt that N.F.S. had done more than any other organisation to popularise the pleasures of flying. They were, he said, among the pioneers of progress and had established many of the new Municipal Aerodromes, one of the most recent which he had just heard of was the new aerodrome which was being built at Portsmouth. Hanworth was the parent and exemplar of all other such clubs and set a standard which though high was undoubtedly the right one to follow. Taxi work had, under their careful management, grown to be a large and important business, and he anticipated that before long N.F.S. would be maintaining taxi ranks at the main terminal aerodromes such as Croydon where travellers who came from the Continent would be able to get a machine to take them anywhere at a minute's notice.

At present the fleet maintained was not exceptionally large, but it was growing as the demand grew and when the demand warranted it he understood that the number of machines available would be increased to meet the needs of the demand. It was, said Lord Brentford, a huge undertaking to run such a concern as N.F.S. and he knew that they were making a really good thing of it, and he therefore had much pleasure in wishing them every success and prosperity.



An aerial view of the machines drawn up for inspection by Lord Brentford at Hanworth.

THE LIVERPOOL-CROYDON SERVICE

IMPERIAL AIRWAYS have opened a service from Croydon to Liverpool which will call at Birmingham and Manchester. They are receiving a subsidy of £1,000 from each of the three cities to run the service as a start for three months, and on Monday evening the first machine, piloted by Capt. O. P. Jones, left Croydon at 5.15 p.m. and arrived at Liverpool at 7.55 p.m. On this occasion an Argosy from the Silver Wing service was sent up but in future for regular work Handley Page W.10's will be used. The landing at Speke, the new Liverpool municipal aerodrome which will, when finished be one of the finest aerodromes in the country in civil use, was in the nature of an historic occasion as the Argosy was the first machine which has ever landed there.

The return machine which left Liverpool at 7 a.m. on Tuesday morning arrived at Croydon in spite of the very thick weather, within a few minutes of the scheduled time.

The object of the service is to enable travellers from the North and Midlands to go by the quickest route to Paris, Basel, Berlin, Amsterdam, and other cities, and the arrival of the aeroplanes at Croydon is timed to connect with the air liners leaving for all parts of Europe.

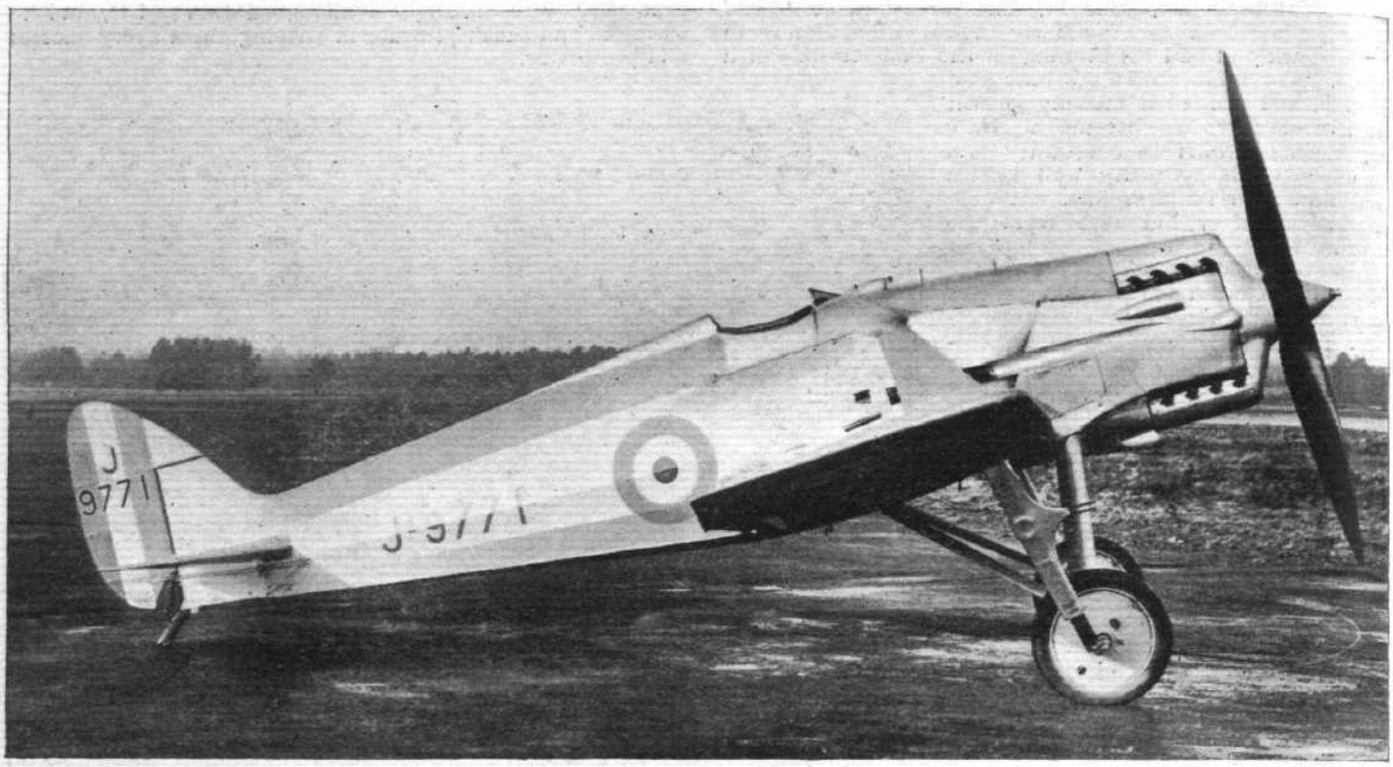
Time Table and Fares

Leave.	Arrive.
Croydon, 5.15 p.m.	Birmingham, 6.35 p.m.
Birmingham, 6.40 p.m.	Manchester, 7.30 p.m.
Manchester, 7.35 p.m.	Liverpool, 7.55 p.m.
(Mondays, Wednesdays, and Fridays.)	
Liverpool, 7 a.m.	Manchester, 7.20 a.m.
Manchester, 7.25 a.m.	Birmingham, 8.15 a.m.
Birmingham, 8.20 a.m.	Croydon, 9.40 a.m.
(Tuesdays, Thursdays, and Saturdays).	

Single fares: Birmingham-Croydon, £1 10*s.*; Manchester-Croydon, £2 17*s.* 6*d.*; Liverpool-Croydon, £3; Manchester-Birmingham, £1 5*s.*; Liverpool-Birmingham, £1 10*s.*; Manchester-Liverpool, 15*s.* (Return fares double, less 5 per cent.)

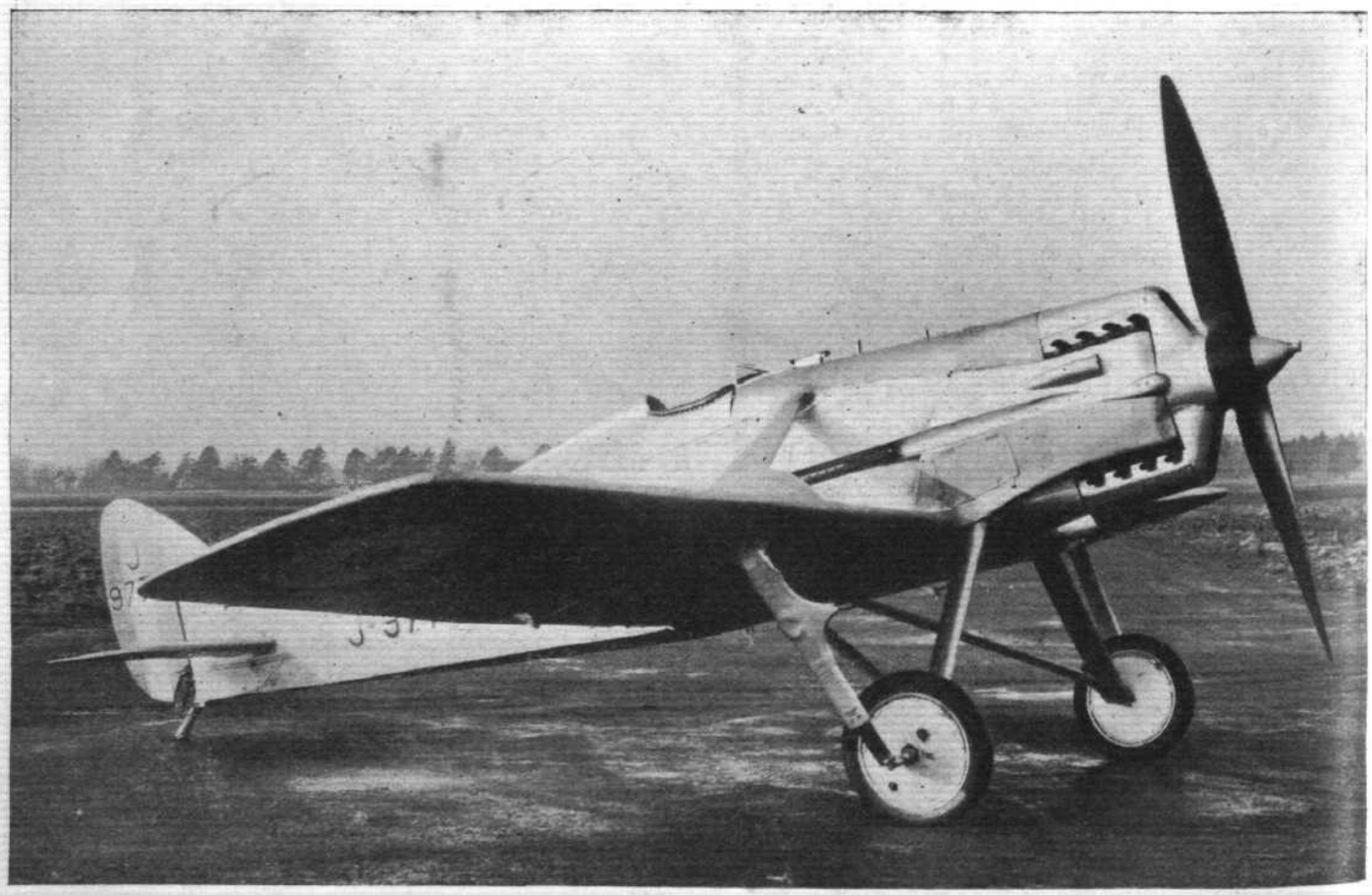
Through fares: Liverpool-Paris, £8 5*s.*; Manchester-Paris, £8 2*s.* 6*d.*; Birmingham-Paris, £6 15*s.*

DE HAVILLAND INTERCEPTION FIGHTER



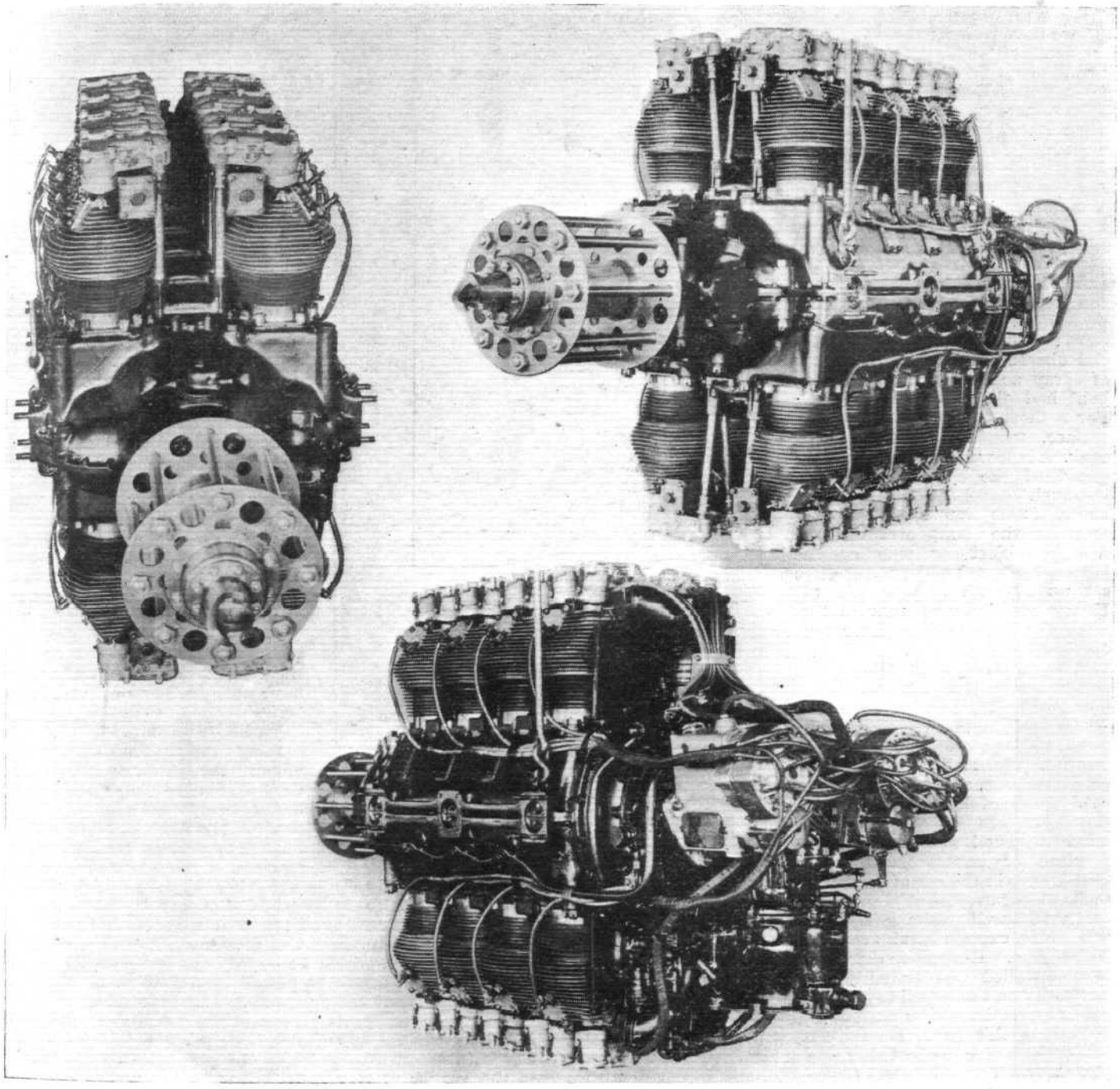
ONE of the most interesting service types produced in recent years is the interception Fighter, designed and built by the De Havilland Aircraft Co., Ltd., and shown in the accompanying photographs. The machine was designed for the Halford-Napier "H" engine illustrated on the next page. In spite of the relatively low power (something over 300 b.h.p.), this machine has a performance comparable with that of machines fitted with much more powerful engines. This is due largely to the small frontal area of the "H" engine, but also, of course, to the fact that a smaller engine enables a reduction in aircraft size to be made, less petrol has to be carried for a given duration, and so forth.

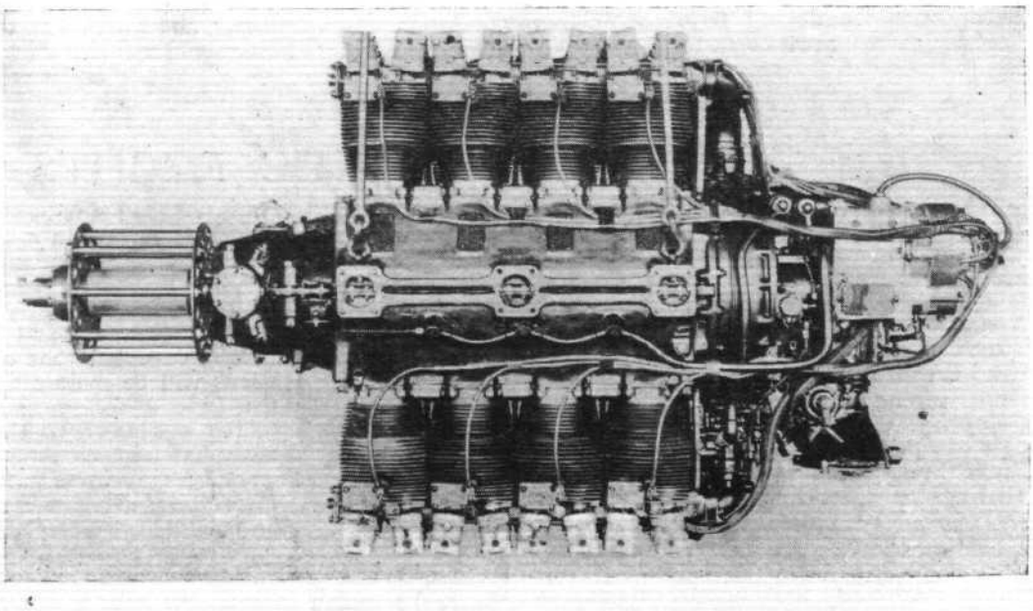
The "H" engine was designed by Maj. Halford, and the building and experimental development were undertaken by the Napier firm.



Air Ministry Photographs, Crown Copyright.

AN UNUSUAL 16-CYL. AIR COOLED





Four Views of the Halford-Napier "H" Engine. This engine, fitted in the D.H. Interception Fighter shown on the previous page, is of unusual design in that it is an air-cooled with its cylinders arranged in the form of a letter "H." There are two crankshafts, propeller-reduction gear, and a supercharger. For a weight of 620 lb. the engine develops something more than 300 b.h.p.

DEATH OF SIR HENRY SEGRAVE

IT is with the greatest regret that we have to record this week the death of Sir Henry Segrave as a result of an accident to the speed boat "Miss England II" on Lake Windermere on Friday of last week, June 13. The exact cause of the accident is not at the moment known, as the boat has not yet been raised from the bottom of Lake Windermere, where she lies in nearly 200 ft. of water. Sir Henry was making the runs over the measured course in an endeavour to beat the existing world's record, and had completed two of the four runs prescribed. It was during the third run that the accident occurred. Onlookers suddenly saw huge clouds of spray and an instant later the boat had disappeared from sight. For a short time she came to the surface, turned bottom up, and sank. A hole was seen in the bottom ahead of the step, but until a thorough examination has been made, it is impossible to say whether the boat struck some floating object or whether the bottom collapsed under the stresses set up at such high speed. Sir Henry was rescued immediately after the mishap, but later succumbed to his injuries.

With Sir Henry at the time of the accident were Mr. J. Wilcocks and Mr. P. V. C. Halliwell, engineers. Mr. Wilcocks was flung clear in the crash, and is now recovering from his injuries. Mr. Halliwell went down with the boat, and when his body was recovered later it was found that he was clasping in one hand a pencil and in the other a piece of paper, having evidently been in the act of jotting down some figures when the accident occurred.

Sir Henry Segrave standing in front of the ancient Opel car with which he made his debut in the motor racing world.

(FLIGHT *Photo.*)

Mr. Halliwell was a graduate of Bristol University, and was chief experimental aero engine tester to the Rolls-Royce firm. His official duties ended when the engines had been installed and tested, but he agreed to accompany Sir Henry on the actual test runs, although this was purely a voluntary action on his part, and he could have little to gain by taking this risk. He took it, with such keenness and readiness to give the best that was in him, as those who knew Mr. Halliwell would expect him to do, and by his death we lose not only a very clever engineer but a gallant gentleman.

Henry O'Neal Dehane Segrave born on September 22, 1896, son of Mr. C. W. Segrave, of Coombe Court, Witley, Surrey, was educated at Eton and Sandhurst. Gazetted to the 2nd Royal Warwickshire Regiment during the war, he was later transferred to the R.F.C. After being wounded he was attached to the British Embassy at Washington, and there became interested in motor-car racing. He returned to England in 1919, and bought an old Opel car of 1914 vintage which he tuned up to concert pitch. After a number of wins at Brooklands he joined the Sunbeam staff of racing drivers and took part in many famous races. In 1927, on Daytona beach in America he established a world's speed record for motor cars by doing 203·8 m.p.h. in his Sunbeam car. In 1929, on another car designed by Mr. Irving and fitted with Napier "Lion" engines, he increased the record to 231·6 m.p.h. This was on the famous "Golden Arrow" car.

Segrave then turned his attention to motor boats, and began by trying boat racing in outboard motor boats, later having "Miss England I" built for him, on which he won a victory on points, although the speed record remained in America. "Miss England II" was built, with the financial assistance of Lord Wakefield, to attempt to beat Gar Wood's motor boat speed record, and but for the accident there is no doubt that she would have done so, her two Rolls-Royce Schneider engines developing something like 4,500 h.p.

Some time ago Sir Henry Segrave joined the Aircraft Investment Corporation as technical adviser, and was responsible for the production of the "Meteor" aeroplane, built by Saunders-Roe. This machine is a departure from orthodox practice, and promises to come up to the high expectations which Sir Henry entertained concerning her.

Altogether, Sir Henry Segrave has lived a life richer and fuller than falls to the lot of most men, and in spite of the eminent position which he carved out for himself, he was much too great a man to permit himself to be unduly influenced by his many achievements. He never lost his charming manner, nor his ability to put at their ease great and small alike, and no one who has had the privilege of knowing him can fail to mourn very deeply the passing of an Englishman of the very best type. On behalf of our readers and ourselves, we extend to the relatives of Sir Henry Segrave and Mr. Halliwell our sincerest sympathy in their bereavement.

A Memorial Service was held at St. Margaret's, Westminster, and the funeral took place at Golders Green Crematorium on June 17.

THE ATLANTIC FLIGHTS

CAPT. T. KINGSFORD-SMITH, Mr. Evert van Dyk, Capt. Saul and Mr. J. W. Stannage, the crew of the tri-motored Fokker monoplane "Southern Cross," are still at Baldonnel aerodrome, County Dublin, awaiting favourable weather before leaving on their attempt to fly the Atlantic.

Mr. C. C. Maidment, of the Wright Aero Company, New York, (who tuned up Lindbergh's engine) has spent some time in finally tuning up the engines.

Capt. J. P. Saul, an Irishman, has been selected for the post of navigator, and his plans are to follow the Northern Great Circle as far as Cape Race then turn towards Maine, skirting the coast to New York. The estimated time for this trip of 3,100 miles is 34-35 hours, the cruising range of the "Southern Cross" is 38 hrs., and Capt. Kingsford is of the opinion that he has a sufficiently large margin of safety unless abnormally bad weather is encountered. The petrol capacity of the machine is approximately 1,200 gallons, most of which is carried in a tank separating the pilot's cockpit (dual control) from the main cabin, communication between the two is by means of Morse buzzers. The machine when fully loaded weighs nearly 10 tons. A wireless set of exceptionally wide wave-band has been fitted (28-2,000 metres), and it is expected that contact with either ships or shore stations will be maintained throughout the journey.

On June 7, following a favourable weather report, the machine was flown to the Curragh plain, where a special runway has been constructed, but as a later report was not so good, the start was postponed.

Meanwhile the French airmen, Costes and Bellonte, are reported to have completed preparations for their attempt from France in the Brequet *Question Mark*, and are also awaiting an opportunity to start. Will this be the first Atlantic Air Race?

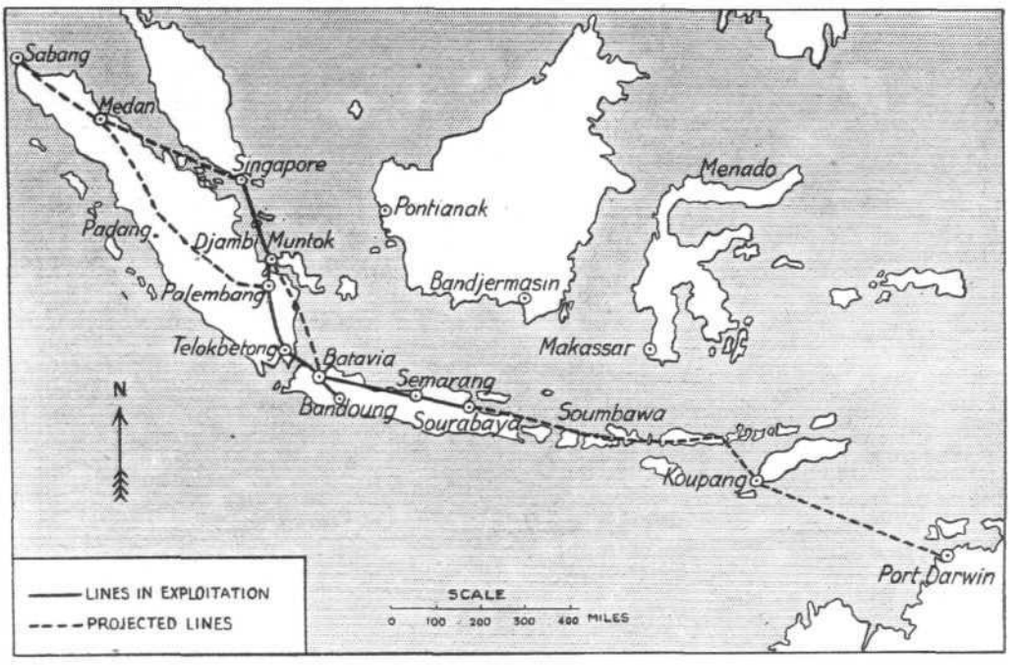
AIR TRANSPORT

A SUCCESSFUL DUTCH AIR SERVICE

K.N.I.L.M. Operations in Dutch East Indies

AIR transport of passengers and mails has more than once proved its value in remote parts of the world, where ordinary transport is more or less of the "few-and-far-between" variety. In such cases, it has not only provided improved and speedier transport facilities for the inhabitants, but in some instances it has been the means of opening up possibilities as regards the commercial and trade development of the district or country concerned.

One such air service is that operated by the Royal Dutch East Indian Air Lines Co. (K.N.I.L.M.) in the Dutch Indies. An interesting account of this service is published in the May issue of the *Armstrong Siddeley Air Mail*, and through the courtesy of its Editor we quote this below :—



Sketch Map showing the principal air lines in the Dutch East Indies

"By November 1, 1929, the K.N.I.L.M. had finished one year's operation. The company began with four Fokkers F. VIIIb, equipped with Armstrong Siddeley Lynx engines, which machines were flown from Amsterdam to Batavia. After six months, the fifth machine was sent to Batavia.

The total fleet amounts now to five machines, for which 21 engines are available, so that there are only six reserve engines. These engines have given total satisfaction, and the company has now an experience of about 10,000 engine hours, the oldest engine having done about 900 hrs.

The fine flying qualities of the Fokker machines, combined with the reliability of the engines and the wonderful climate in the Dutch East Indies, have enabled the company to maintain a regularity of 100 per cent. throughout the year. During the period under review, the company has been running the following lines :—

Batavia-Bandoeng, 74·5 miles (120 km.) and return, twice daily ; Batavia-Samarang-Sourabaya, 416·3 miles (670 km.), and return, once daily ; Batavia-Palembang, 363·5 miles (585 km.), and return, once weekly.

The main income of the company comes from the transport of passengers. In one year, 11,300 passengers were transported. No forced landings were made, and the first year's fine record made the K.N.I.L.M. very popular in the Dutch East Indies and won the confidence of the public.

The chief of the company in the Dutch East Indies is Mr. H. Nieuwenhuis, an old and experienced pilot who got his business training during several years with the K.L.M.

The majority of the staff and pilots were taken over by the K.N.I.L.M. from the K.L.M. (the Royal Dutch Airlines). The latter company make fortnightly trial mail flights between Amsterdam and Batavia.

The skilled technical staff of the K.N.I.L.M. have their workshops in Bandoeng, where the necessary technical help is always available for the machines on arrival.

In 1930, the line Batavia-Palembang, will be prolonged to Singapore, and from there to Medan. For this last line, three-engined land machines will also be used.

It is expected that in the near future the airlines in the Dutch East Indies will be extended eastwards to Timor Koupang. From the map it will be seen that the line from Singapore to Timor Koupang is about 1,864 miles (3,000 km.). This line will be of great importance for connecting Singapore and Melbourne.

The aerodromes in the Dutch East Indies are developing very quickly, so that it is hoped that when the foreign traffic passes the Dutch East Indies, the necessary ground organisation will be ready.

The Dutch East Indian Government takes a large interest in aviation, the K.N.I.L.M. receiving a subsidy of one million guilders per annum for the first five years.

The company was founded by the principal banks, shipowners and business houses in Holland and the Dutch East Indies, and although it was decided at the outset that both companies would remain independent of one another it is intimately bound with the K.L.M., an arrangement which is very advantageous, both commercially and technically, to both companies.

Our Blue Air Mail Pillar-Boxes

THE Postmaster-General announces that a number of special posting boxes have been erected in the City and West End of London for the reception of air mail correspondence only. These boxes will be available for posting on June 23. Correspondence intended for air mail transmission may still be posted at any post office or in any posting receptacle, but the use of the special air mail boxes will offer certain advantages. The letters, etc., will be collected from them by special air mail motor vans, and will be conveyed direct to the air mail despatching point at the General Post Office, thus ensuring the greatest possible rapidity of transit and certainty of connection. Generally, later times of posting for air mails will be available at the special boxes than at other points in their vicinity, and the air mail services with which the various clearances connect will be shown on the boxes. It will be still necessary to attach air mail labels to letters, etc., posted in the special boxes or, alternatively, to mark them prominently with the words "Air Mail." Special attention is called to the danger of posting in the special air mail boxes correspondence not intended for air mail transmission or not prepaid with the appropriate air mail fee. Such correspondence will almost certainly be delayed.

Boxes have been erected on the following sites :—

King Edward Street, E.C.1. (Outside G.P.O.) ; Outside Ludgate Circus Branch Post Office, E.C.4 ; Moorgate, E.C.2 (opposite Britannic House) ; Front of Royal Exchange, E.C.3 ; Outside W.C. District Post Office, High Holborn, W.C. ; High Holborn W.C. (South Side, opposite Staple Inn Buildings) ; East Strand W.C. (near Surrey Street) ; Outside Charing Cross Branch Post Office, W.C. ; Oxford Circus, W.1 (N.E. side) ; Piccadilly Circus, W.1. (opposite Pavilion Theatre ; Victoria Station, S.W.1 (entrance to forecourt).

Additional boxes will be provided shortly at :—Charles Street, Haymarket, S.W.1. (Front of Imperial Airways Offices) ; Outside Parliament Street Branch Post Office, S.W.1.

AIRISMS FROM THE FOUR WINDS

The King's Cup Air Race

THERE are now five additional entries to the list published in last week's issue, bringing the total up to 101. These are as follows: No. 97, George G. Parnall, pilot H. A. Presto, Parnall "Elf" G-AAFH ("Cirrus Hermes"). No. 98, entrant and pilot, W. R. Westhead, "Martlet" (Armstrong-Siddeley "Genet II"). No. 99, entrant and pilot, Miss F. M. Wood, D.H. "Moth" ("Gipsy"). No. 100, entrant and pilot, M. D. L. Scott, D.H. "Moth" ("Cirrus II"). No. 101, entrant, O. F. Maclaren, pilot, Capt. G. A. Pennington, D.H. "Moth" ("Gipsy I"). Miss T. M. Wood, who holds an Air Ministry licence for Navigation, brings the total of women pilots up to seven. It may be of interest to note that Capt. C. D. Barnard, who will pilot the D.H. "Puss Moth" entered by R. Faulkner, will have as his navigator a master-hand in Bert Hinkler—so this should be a formidable combination. We are informed by Armstrong-Siddeley Motors, Ltd., that for the benefit of competitors using Armstrong-Siddeley engines, specially trained mechanics will be available at the London, Bristol, Manchester, Newcastle and Hull controls.

THE KING'S CUP

Miss Amy Johnson

MISS AMY JOHNSON is still being feted in Australia. On June 12 she flew to the Broadmeadow Racecourse at Newcastle, where she was greeted on landing by thousands of people. Later she attended a civic reception and luncheon at the Town Hall, after which she returned to Sydney by air. It was arranged that Miss Johnson should fly to Canberra on June 14 in a D.H. "Hawk Moth," piloted by Major de Havilland, but thick fog prevented the machine from reaching its destination, and a landing was made at Goulburn. Three escorting aeroplanes, however, managed to reach Canberra, where Mr. Scullin, Australian Prime Minister, and other Members of Parliament, and a large crowd had waited 2½ hr. in the cold for Miss Johnson—so the luncheon planned for her honour was held in her absence, the escorting pilots being the principal guests. Miss Johnson arrived eventually next day, and received a hearty welcome; she left later for Wangarratta, en route for Melbourne. She arrived there on June 16, landing on the racecourse amid the cheers of some 15,000 people. After luncheon with the Lieut.-Governor, Sir William Irvine, Col. Brinsmead, Controller of Civil Aviation, presented her with the No. 1 Civil Air Pilots' licence (Australian).

Our Flying Princes

ON June 12 the Prince of Wales, accompanied by Capt. J. R. Aird, flew back to London from Edinburgh, where he had attended to support the Royal Infirmary appeal for £500,000 and to open a hospital and home for ex-Service men. The Duke of Gloucester flew to Cambridge recently, where he received an honorary degree from the University, and on June 13 he flew to Leicester to attend the Leicestershire Agricultural Show. After the show he flew back to Northolt Aerodrome.

R.A.F. Flying Boat Cruise to Iceland

ON June 21 two R.A.F. Blackburn "Iris" flying boats from the Mount Batten Air station, under the command of Wing-Comdr. S. Smith, will set out from Plymouth Sound on a flight to Reykjavik, Iceland, where, in company with H.M.S. *Rodney*, they will represent Britain at the 1,000th anniversary celebrations of the foundation of the Icelandic Parliament. Flying via the west coast of Wales, the first stop will be made at Stornoway, in Scotland, about 600 miles from Plymouth. From here they will proceed to Reykjavik, another 700 miles, with a call at Faroe Island for refuelling.

Mount Batten–Basra

THE two Supermarine "Southampton" flying boats of No. 203 (Flying Boat) Squadron, under Sqdn.-Ldr. G. W. Bentley, D.F.C., and with Flight-Lieuts. W. J. Daddo-Langlois and A. P. Revington, and Pilot Officers G. Barrett and R. Drew, which are flying from Mount Batten to Basra, arrived at Athens on June 12.

The Engines of R 101

WHEN H.M. airship R 101 flies over Hendon during the R.A.F. Display she will be driven by the same Beardmore engines as on previous flights. Since the airship was last in the air, however, the engines have been sent to the Beardmore works at Glasgow. One of them did a successful run of 200 hours on a bench—the last 50 hours being a non-stop run. As a result, certain modifications were decided upon and have been incorporated in all the five engines. The wiring of the gas bags has now been let out 3 in. all round, which will add about three tons to the lift. The servo-motor for operating the controls has been removed, and other modifications have reduced the tare weight of the airship. The new transverse ring and gas bag will be inserted after R 101 has flown over Hendon during the R.A.F. Display.

R 100's Flight to Canada

THE Air Ministry states that since the announcement was made that the R 100 would not be able to fly to Canada before the end of the present month a request has been received from the Canadian Government that the flight should be postponed until after the elections, which close on July 28. The programme has accordingly been altered, and the flight will not now commence till the last three days of July, although the repairs to the airship have proceeded satisfactorily and are expected to be completed by the end of next week.

N.W. Indian Frontier and R.A.F.

IN connection with the tribal disturbances in the North-West Frontier Province, where, it is reported, seditious propaganda and anti-Government activities were carried on months before the Peshawar outbreak, the *Times of India* asks why the R.A.F. was not used at the first sign of trouble. It points out that fewer tribesmen would have been killed and the lives of several British soldiers would have been spared if the order for action by the R.A.F. had been given earlier.

U.S. Activity in New Zealand?

ACCORDING to the Wellington (N.Z.) correspondent of the *Daily Telegraph*, it is reported that three American concerns are investigating the possibilities of commercial aviation in New Zealand. This is apparently resented, and strong influences are at work to induce British aircraft companies to take a hand.

Cherbourg Air Connections with Transatlantic Liners

IT was decided at a recent meeting of the French Ministers of Air, Marine, and Posts and Telegraphs to open in the near future air mail services between Cherbourg, Basel, Paris and Cologne, to operate in conjunction with transatlantic liners calling at Cherbourg.

A Balloon Adrift

A KITE balloon, belonging to the Royal Air Force, which was observing for artillery at a practice camp in Merionethshire, broke loose from its winch on Wednesday, June 11. The two observers, F/O. A. J. P. Groom and Sergt. G. W. Robinson, jumped as soon as the balloon came close to the ground, but the legs of the officer got entangled in the ropes. Sergt. Robinson chased the balloon for two miles across country, and finally was able to release F/O. Groom, who was none the worse for his adventure.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

June 20, 1930

CONTENTS

WING FLAPS ON AIRCRAFT

By Captain Norman Macmillan, M.C., A.F.C., A.F.R.Ae.S.

Captain Macmillan, a director of the Fairey Aviation Co., Ltd., and for many years chief test pilot to that firm, will need no introduction to readers of FLIGHT. *His work in the aircraft industry is well known, and as author of such books as "The Art of Flying," and "Into the Blue" Captain Macmillan has become known and greatly liked by thousands, abroad as well as at home. In spite of the fact that, one way and another, he is an extremely busy man, we have been fortunate enough to obtain from Captain Macmillan the following article on a subject which has received but little attention lately. It may come as a surprise to many to learn that Captain Macmillan arrives at the conclusion that the function originally thought to be the main purpose of the wing flap,* i.e., *to give extra lift, may actually, in the full-size machine, be less important than the attendant reduction in drag of the whole machine. Captain Macmillan expressed the view that there may be some aerodynamic value in using wings the incidence of which can be varied by the pilot. It may be recalled that a machine, the Paul Schmitt biplane, was built in France before the war, incorporating this feature. For a time that machine held one or two world's records for weight lifting.*

It is perhaps curious that wing flaps are so little understood. First introduced at a time when less was known of wing sections than we know to-day, their purpose was then definitely and solely that of providing increased lift at low speeds. In this respect they succeeded, by reducing the run required to take off, by reducing the speed at which air-borne flight commenced and ceased, and by decreasing the decelerating run after alighting. Subsequently it was found that by graduated adjustment of the setting, the rate of climb could be improved, and, by slight alterations from normal, the top speed could be increased in certain cases.

To-day, improvements in wing sections have modified the relative effect of flaps. Some wing sections show a greater percentage increase in speed range when fitted with flaps than do others. To such an extent does this variation occur that it can safely be said that on some sections the effect of flaps upon the speed range is almost immeasurable by the pilot when flying the full scale aeroplane, whereas upon others it is about 12½ per cent.

It may perhaps seem curious that the Fairey Aviation Co., Ltd., should have adhered so consistently to the policy of designing aeroplanes with flap-fitted wings when other aircraft design firms have just as consistently ignored the wing-flap And, since there is a good deal of misunderstanding about the use and benefit of the flap-fitted wing, it may appear reasonable that one who has served that company as chief pilot for a period of six and a-half years should give some account of the value of the device.

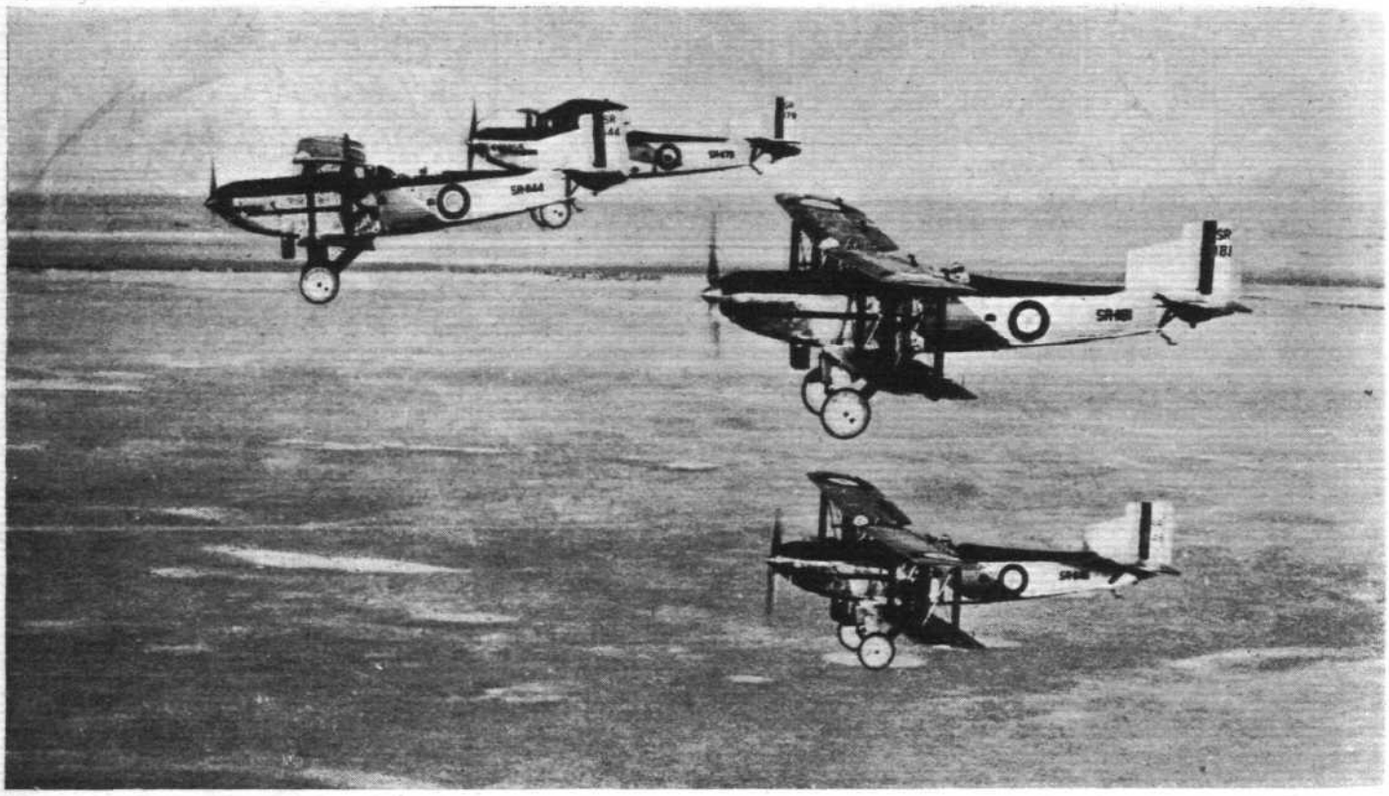
There is little doubt that the average pilot is a conservative individual, in which statement there is no implication that there are many who like to know more, who are always willing to learn and to try anything new. But the great majority look upon innovations and strange devices with some mistrust. It is due to this quality in the individual that many machines fitted with flaps are consistently flown without the flaps being used or without their being used to their maximum extent. But when pilots realise that on certain machines the correct use of flaps reduces the alighting speed by from 5 to 8 miles per hour without any diminution of safe and adequate control, they are more than willing to take advantage of the benefits of flaps. The unfortunate truth is that many pilots timidly try the effect of a very few degrees of flap for alighting, find little differences in the speed of contact, discover a definite change in the approach of the aeroplane and, without analysing the reasons for either result, instantly decide to discard the use of flaps altogether, to their own and the machine's future disadvantage. It is with a view to clearing up some of the misapprehensions which exist regarding the use of flaps, and to elucidate some of the special properties of the device, that this article has primarily been written. The writer does not propose to disclose specific information which is rightfully to be regarded as the confidential property of the Fairey Aviation Co., Ltd., obtained by that company at the cost of very considerable experimentation over a period of many years. Those who seek such information will be disappointed in this article, but those who have little or no knowledge or experience of the flap, and those who have not found in it the virtues which it undoubtedly possesses, may find something of worth herein.

There are several different forms of flap gear, each of which has some special claim to warrant its use on certain types of aeroplanes. The flap which provides the maximum addition to the speed range is that which, when lowered, provides a cambered effect throughout the complete span of each wing. In this type the ailerons are divided from the flaps proper but are lowered with them to the same angle. At any setting, and during adjustments of setting, the ailerons

can be used for lateral control without interruption. This is the type used upon the Fairey III C, D, and F. A second type is that in which one-piece ailerons of normal design run the whole length of the rear wing spars and can be lowered or raised by independently operatable mechanism. This type can only be applied to aeroplanes of small span, and is used upon the Fairey Flycatcher. These two types provide the maximum increase of speed range. There are two variations of these types. In the first the inner or true flap portion is used as a flap, the outer portion being used as an aileron only; when the flap is lowered the outer portion, or aileron, remains in line with the wing. This was the type used upon the Fairey Fawn. In the second type, ailerons of slightly abnormal design, but which do not run the full length of the rear spars, are lowered or raised, serving as ailerons at all times and as flaps when lowered. This is the type used upon the Fairey Firefly, in which efficiency is of quite a high order.

There are several methods of compensating the operating mechanism for the variable setting of the flaps. In the III F, rubber elastics in the return cable system accommodate themselves to the different settings and provide the return both for the flaps and for the ailerons in their upward travel. In the Flycatcher, compensation is provided in the balance cable. In the Firefly, special link mechanism has been designed. The last type, which is the latest, offers the great advantage of avoiding all increase in aileron operating loads whatever the flap setting, whereas the earlier types increased the hand load upon the stick as flaps were lowered, this increase being mostly due to the increased tension of the rubber elastic. Some of the bias which has existed among pilots against the use of flaps has been brought about by this increase in the stick load. With the latest types of flap gear, however, it is possible not only to prevent any increase in load due to the functioning of the operating mechanism, but actually to make the aerodynamic forces as light as the most delicate-handed pilot could desire. This feature in the latest types of flap gear has enabled aileron control to be developed on high speed range aeroplanes to a degree of controllability and ease of operation which have never been obtained previously without the introduction of aerodynamic balancing with its attendant drawbacks when applied to ailerons.

Change of flap setting has a dual effect upon most aeroplanes. There is a change of centre of pressure upon the wing and there is also a deflection of the downwash of the air-flow leaving the planes. The deflection is usually found to affect the relative angle of attack of the tail plane to the air-flow about it. On most aeroplanes it will be found that less tail-plane incidence is required when flaps are used; but upon a few I have found that more incidence is required when flaps are used, thus indicating that the deflection of the air-flow produces a greater moment than the change of C.P. Again, when flaps are used, it is normal for the pilot to increase wing angle of attack in flight, thereby compensating more or less for the C.P. change due to the lowering of the flaps. Apart altogether from change of thrust due to operation of the throttle lever by the pilot, a procedure which usually affects the fore and aft trim, any alteration of the flap setting will be found to produce an out-of-trim moment, which must be corrected by varying the setting of the adjustable tail plane.



A FLIGHT OF FAIREY IIIF AEROPLANES: Note that the leading machine has its flaps down, and that as a result the fuselage is at a small negative angle.

But the effect of altering the setting of the flaps does not cease with these outward and immediately noticeable signs which the pilot observes when he brings them into operation, and perhaps the most valuable feature of the use of flap gear consists in the modification of the fuselage flying angle to the horizontal.

When the flaps are lowered the result is similar to that which would be produced by an increase of wing angle to body. The wings then produce the required lift with a greater negative fuselage angle. This has the useful property of lowering the nose of the aeroplane when on the glide, thereby improving the pilot's approach view for landing. The change in fuselage angle which follows a pronounced positive setting of the flaps is well illustrated in the accompanying photograph of a flight of Fairey III F aeroplanes, in which it can be observed that one machine is flying with the fuselage trimmed nose down in spite of the fact that the aircraft are flying in level formation. And it can clearly be seen that this particular aeroplane is flying with the flaps set well down, whereas all the others have their flap settings normal, that is, in line with their wings. This abnormal use of flap setting has a very pronounced effect upon speed when flying level, owing largely to the considerable increase in fuselage drag, for the wing setting to fuselage is selected by the designer to reduce

fuselage drag to the minimum at the higher speeds. Therefore, any increase in speed obtainable by the use of flaps can only be achieved if the normal setting does not result in the aeroplane flying with its fuselage at the angle of least resistance, and since the amount which the fuselage may be out of this line can only be slight, if any, the flaps can only be set a very small amount from normal without beginning to show a decrease in speed. I have not found on modern aeroplanes that extra top speed can be obtained at low altitudes by the use of flaps, although in machines of earlier design some two miles per hour could be gained by a slight upward, or negative, setting of the flaps. In this connection, it is important to note that high speeds, particularly diving speeds, should not be permitted with the flaps set at large angles, because of the extra load upon the weaker rear spar which is unavoidable with the C.P. further back.

The effect of flaps upon the climb is interesting. The principal value of the device in this case is to enable the pilot throughout the climb so to adjust the wing angle relative to the fuselage that the fuselage drag is kept to the minimum. Under the constantly changing conditions of density and power which the aeroplane experiences upon the climb, the pilot is forced to accommodate the wing angle of attack and the forward speed to offer the best compromise in rate of climb developed. It is easy to see that the fuselage angle to the airflow plays a considerable part in the drag upon the climb. The flap eliminates some of this drag because it permits the pilot to adjust the fuselage angle in relation to the wing angle to provide the best lift/drag ratio possible with the flap-fitted wing at all heights. We have already seen that misuse of flaps at low heights will result in loss of speed. Precisely the same thing can occur at height. There is only one best setting for climb at any given height, and only one best setting for speed at any given height. It is up to the pilot to make himself familiar with the proper use of a device, which, badly used on some aeroplanes, can make as great a difference as four thousand feet in ceiling, a result which I have found can occur through attempting to use a greater flap setting than is correct at height, while insufficient flap also reduces both climb and ceiling. Some aeroplanes are very sensitive to the correct setting (more so than others) which leads one to the conclusion that certain types of fuselage are less sensitive to changes of angle than are others in which the drag can go up very rapidly if the flap setting is incorrect.

The method of determining the correct flap settings for climb is by the carrying out of a series of partial climbs at different speeds with a constant flap setting, then repeating with a different setting. It requires patience to determine the actual best speed and setting, but the result is worth obtaining.

To sum up the question of the value of flaps, it can be said that the flap camber gear succeeds in the following respect, in a degree which may vary with different wing sections and different full-scale aircraft designs.

(1) It decreases run to take off.
(2) It decreases speed of take off.
(3) It reduces speed of alighting.
(4) It decreases landing run after alighting.
(5) It increases rate of climb and ceiling.
(6) It increases speed at some heights.
(7) It enables aileron control to be adjusted automatically to suit varying conditions.

It should be noted that the theoretical net effect of the flap gear is virtually to increase the lift coefficient of the wing. But under the conditions of full scale flight in which most of the experience of flap camber gear has been obtained, it is difficult if not impossible to distinguish between true increase in lift and actual reduction in drag. I am convinced from my experience with flap-fitted aircraft that the device succeeds more by a reduction of drag upon the complete aeroplane than by any other virtue. And one is inevitably lead to the final thought that there may be some aerodynamic value attaching to an aeroplane in which the complete wing angle of attack in relation to the fuselage can be varied at the will of the pilot, provided that the mechanical difficulties in connection therewith can be overcome.

IN THE DRAWING OFFICE.

A DRAWING OFFICE PROBLEM

By E. H. ATKIN, B.Sc.

Occasionally a rather unusual geometrical problem arises in various forms. The most common examples occur in the design of struts. A practical instance is the case of a strut running obliquely between two joints in such a way that the jaws of the sockets at each end of the strut have to be rotated so that they are at an angle with one another. Another example is the case of a streamline strut, running obliquely in a similar manner. Here the end fittings may have to be rotated in relation to the streamline section, so that the latter may be in the wind when the strut is in position.

A comparatively short experience on aeronautical work seems to indicate that this type of problem, especially where the angle in question requires to be calculated, gives rise to much argument and trouble, as many people have great difficulty in visualising the geometrical relationships of three-dimensional systems. For this reason it was thought worth while, although to the mathematically inclined it may be simple, to state the problem and its solution in typical cases in a reasoned and connected form.

The chief difficulty is that, contrary to the usual geometrical problem, it is not an angle between lines but an angle between planes which has to be determined. Hence we must first be quite clear which planes are involved: when we can do this we are well on the way to a clearer understanding of many practical problems, all variations of this single geometrical one.

Take an example. The strut (*a*) runs diagonally between the joints of a space frame (Fig. 1). One end is attached to an eyebolt whose axis is in the direction *ox*, while the other end picks up an eyebolt whose axis is in the direction *oy*. Evidently the sockets must be rotated with respect to one another.

The plane of the socket jaws at *A* is determined by the consideration that it must contain the axis of the strut *a* and the axis of the eyebolt *b*, while the plane of the socket jaws at *B* must contain the axis of the strut *a* and the axis of the eyebolt *c*.

It is required to determine the angle between the planes *ab* and *ac*.

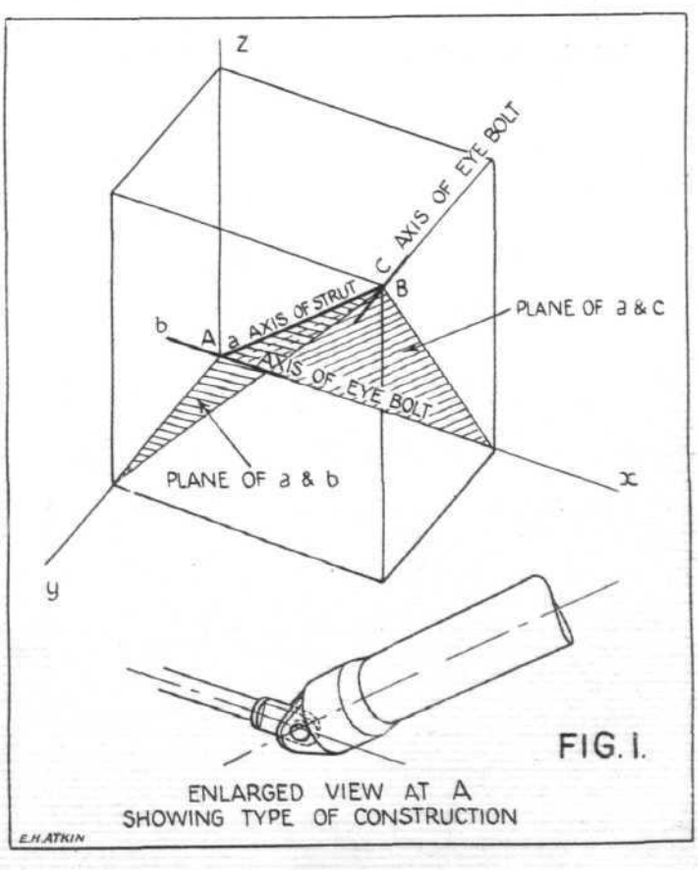


FIG. 1.

ENLARGED VIEW AT A
SHOWING TYPE OF CONSTRUCTION

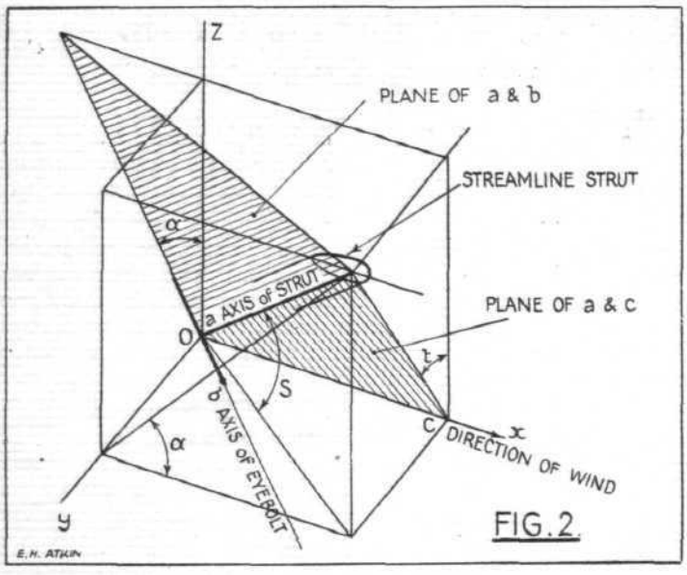


FIG. 2.

Again, take the case of the streamline strut (Fig. 2), a is the axis of the strut and b the axis of the attachment bolt through the end fitting. ox is the direction of the wind. The axis b is assumed to be at right angles to the axis of the strut and at right angles to the direction oy. Therefore it is at right angles to the plane of a and oy and lies in the plane of zx. Hence the plane of (a, b) is determined. Remembering that the plane of symmetry of the strut must contain all lines through a parallel to the direction of the wind, the second plane (a, ox) is determined. The angle between (a, b) and (a, ox) is the angle of twist of the streamline section required to bring it into the wind and so give minimum resistance.

Those two examples show the method of reasoning to be used in establishing the planes involved in any particular variant of the problem.

Before deriving formulæ, it is necessary to state the mode of defining the direction of a line. This is in accordance with the usual conventions of solid geometry, viz.: (in Fig. 3) all distances measured from o in the three mutually perpendicular directions ox, oy, oz are positive, while all distances measured from o in the opposite senses, ox', oy', oz' are negative. The direction of a line is determined by its direction cosines, that is, the cosines of the angles it makes with the positive directions of the three axes.

In taking the projection of the line on any axis to determine that direction cosine, due account must be taken of sign.

General Method of Solution

Let (l, m, n) be the direction cosines of the strut axis, and (l_1, m_1, n_1), (l_2, m_2, n_2) the direction cosines of the other lines, determining the planes through (l, m, n).

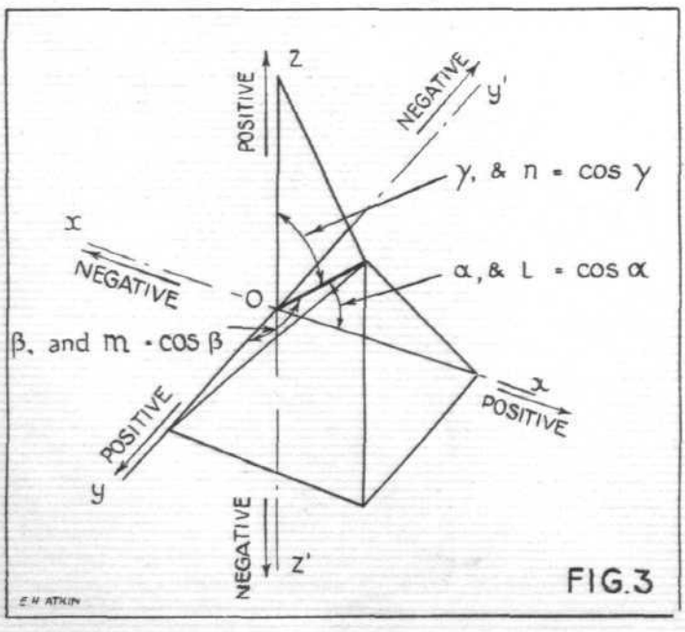


FIG. 3.

Let (a_1, b_1, c_1) be proportional to the direction cosines of the normal to the plane (l, m, n) (l_1, m_1, n_1). Similarly, let (a_2, b_2, c_2) be proportional to the direction cosines of the normal to the plane (l, m, n) (l_2, m_2, n_2).

Then it may be shown that

$$\frac{a_1}{(mn_1 - m_1n)} = \frac{b_1}{(nl_1 - n_1l)} = \frac{c_1}{(lm_1 - l_1m)}$$

and

$$\frac{a_2}{(mn_2 - m_2n)} = \frac{b_2}{(nl_2 - n_2l)} = \frac{c_2}{(lm_2 - l_2m)}.$$

Since the angle between the normals to two planes is equal to the angle between the planes themselves, it may be proved that if ϕ is the angle between the planes

$$\cos\phi = \frac{a_1\,a_2 + b_1\,b_2 + c_1\,c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}} \quad \ldots\ldots\ldots \text{(i)}$$

These expressions may appear cumbersome, but in many cases several of the quantities involved become 0 or 1, and the final formula is much simplified. As an example, consider the strut in the first case above.

Here the direction cosines of a are (l, m, n), while the direction cosines of b are $(1, 0, 0)$, and the direction cosines of c are $(0, 1, 0)$;

$$\text{and therefore } \cos\phi = -\frac{lm}{\sqrt{m^2 + n^2}\sqrt{l^2 + n^2}} \quad \ldots\ldots \text{(ii)}$$

or, since $l^2 + m^2 + n^2 = 1$

$$\cos\phi = -\frac{lm}{\sqrt{1 - l^2}\sqrt{1 - m^2}} \quad \ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

which may be still further simplified by writing $l = \cos\alpha$, $m = \cos\beta$.

$$\therefore \cos\phi = -\frac{\cos\alpha\cos\beta}{\sqrt{1 - \cos^2\alpha}\sqrt{1 - \cos^2\beta}}$$

$$\therefore \cos\phi = -\cot\alpha\cot\beta \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(iv)}$$

A very simple formula.

In the case of the streamline strut, the direction cosines of a are (l, m, n)

while the direction cosines of b are $(-\sin\alpha,\ 0,\ \cos\alpha)$ and the direction cosines of c are $(1, 0, 0)$;

$$\text{therefore } \frac{a_1}{m\cos\alpha} = \frac{-b_1}{n\sin\alpha + l\cos\alpha} = \frac{c_1}{m\sin\alpha}$$

$$\text{and } \frac{a_2}{0} = \frac{b_2}{n} = \frac{c_2}{-m}$$

$$\therefore \cos\phi = -\frac{n(n\sin\alpha + l\cos\beta) + m^2\sin\alpha}{\sqrt{m^2 + n_2}\sqrt{m^2\cos^2 + (n\sin\alpha + l\cos\alpha)^2 + m^2\sin^2\alpha}}$$

$$\text{but } \sin\alpha = \frac{n}{\sqrt{l^2 + n^2}}$$

$$\text{and } \cos\alpha = \frac{l}{\sqrt{l^2 + n^2}}.$$

Hence we may write

$$\cos\phi = -\frac{n}{\sqrt{m^2 + n^2}\sqrt{n^2 + l^2}} \quad \ldots\ldots\ldots\ldots \text{(v)}$$

but if the angles s and t are used as indicated in Fig. 2:—

$$n = \sin s$$
$$m = n\tan t = \sin s\tan t$$
$$\text{and } \therefore \quad l^2 = 1 - m^2 - n^2$$
$$= 1 - \sin^2 s - \sin^2 s\tan^2 t$$
$$= 1 - \sin^2 s\sec^2 t$$

$$\text{so that } \cos\phi = \frac{-\cos t}{\sqrt{1 - \sin^2 s\tan^2 t}} \quad \ldots\ldots\ldots\ldots \text{(vi)}$$

Numerical Example.

In order to clear up any point in the process which may not be clear, it is desirable to close this note with a numerical example of a fairly general type.

We start at the point where the axis of the strut, and the two lines at either end of the strut, required to determine the planes have been fixed in space by the usual system of dimensions (Fig. 4).

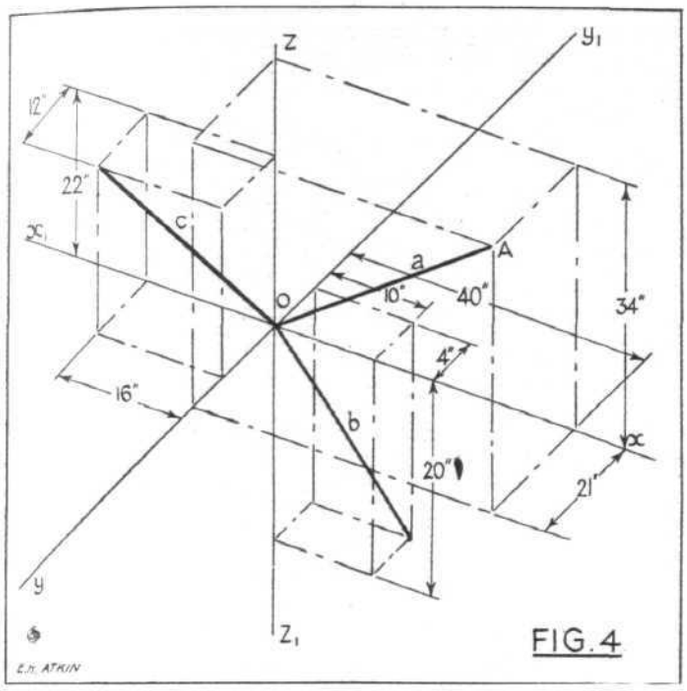


FIG. 4

In calculating the direction cosines one or two practical points should be noted.

Firstly, the direction cosines of any line which does not pass through the origin (point of intersection of *ox*, *oy*, *oz*) are the same as those of a parallel line through the origin, and for the purposes of our problem the location of a line does not matter; we are concerned with directions only. Hence, in calculating the direction cosines of a line, we may imagine the axes drawn parallel to the original axes through any convenient point of the line.

The line *a* in Fig. 4 is the axis of the strut.

From the dimensions

$$a = \sqrt{40^2 + 21^2 + 34^2} = 56{\cdot}5$$

therefore $$l = \frac{x}{a} = \frac{40}{56{\cdot}5} = \underline{0{\cdot}708}$$

and $$m = \frac{y}{a} = \frac{21}{56{\cdot}5} = \underline{0{\cdot}372}$$

also $$n = \frac{z}{a} = \frac{34}{56{\cdot}5} = \underline{0{\cdot}602}$$

The line *b* defines one plane through *a*.

$$b = \sqrt{10^2 + 4^2 + 20^2} = \underline{22{\cdot}7}$$

therefore $$l_1 = \frac{x}{b} = \frac{10}{22{\cdot}7} = \underline{{\cdot}441}$$

and $$m_1 = \frac{y}{b} = \frac{-4}{22{\cdot}7} = -0{\cdot}176$$

also $$n_1 = \frac{z}{b} = \frac{-20}{22{\cdot}7} = \underline{-0{\cdot}881}$$

The line *c* defines the other plane through *a*

$$c = \sqrt{16^2 + 12^2 + 22^2} = 29{\cdot}7$$

therefore $$l_2 = \frac{x}{c} = -\frac{16}{29{\cdot}7} = \underline{-0{\cdot}539}$$

and $$m_2 = \frac{y}{c} = \frac{12}{29{\cdot}7} = \underline{0{\cdot}404}$$

also $$n_2 = \frac{z}{c} = \frac{22}{29{\cdot}7} = \underline{0{\cdot}741}$$

Hence $m_1n - mn_1 = 0{\cdot}2211$, $m_2n - mn_2 = -0{\cdot}0320$

$n_1l - nl_1 = -0{\cdot}8880$, $n_2l - nl_2 = 0{\cdot}8485$

$l_1m - lm_1 = 0{\cdot}2882$, $l_2m - lm_2 = -0{\cdot}4865$

It is to be noted that changing the signs of (a_1, b_1, c_1) (a_2, b_2, c_2) makes no difference to the final result.

And, therefore,

$$\cos\phi = \frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}$$

$$= \frac{-0{\cdot}2211 \times 0{\cdot}0320 - 0{\cdot}888 \times 0{\cdot}8185 - 0{\cdot}2882 \times 0{\cdot}4865}{\sqrt{0{\cdot}2211^2 + 0{\cdot}888^2 + 0{\cdot}288^2}\ \sqrt{0{\cdot}032^2 + 0{\cdot}848^2 + 0.486^2}}$$

$$= -\frac{0{\cdot}9004}{0{\cdot}9535 \times 0{\cdot}9779} = -0{\cdot}966 \therefore \phi = 165°$$

The above example should make the arithmetical procedure clear. The arithmetic may seem a little protracted, but a fairly laborious, but generally applicable, method is very often far quicker on the whole than an ingenious dodge which may require an hour or two for a person unpractised in algebraic manipulation to discover, and which when found, is only available for that particular case.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any bookseller.

THE WING FLUTTER OF BIPLANES. By W. J. DUNCAN, B.Sc., A.M.I.Mech.E. R. & M. No. 1227 (Ae. 382) (60 pages and 13 diagrams). September, 1929. Price 3*s.* net.

The flutter of monoplane wings has been the subject of an extensive investigation which has been described in a monograph on wing flutter (R. & M. 1155). A non-mathematical summary has also been published in R. & M. 1177. Good results have been obtained by applying the recommendations for preventing flutter as indicated by that analysis to biplanes, treating each wing independently. It is, however, also advisable to consider the question of the biplane as such, and this Report deals with the problem. The theoretical treatment adopted is based upon and forms the natural extension of the theory of the flutter of monoplane wings, as given in the earlier monograph, and the recommendations which result from the analysis are to a large extent the same as for monoplanes, but a few novelties are added. The following list of recommendations, together with notes on them, is taken from the Report.

List of Design Recommendations.

Group I.—General Recommendations.

(1) All elastic stiffnesses as large as possible.
(2) Irreversibility of aileron control. Failing (2)—
(3) Centre of gravity of aileron slightly ahead of hinge.
(4) Moment of inertia of aileron small.
(5) An appreciable part, preferably rather more than one-half, of the aileron should lie inboard of the centre line of the attachments of the outermost interplane struts.
(6) Aileron heavily damped, *e.g.*, artificially.
(7) Aileron definitely underbalanced aerodynamically.
(8) Interaileron strut not outboard of the interplane struts. (Only of secondary importance if for any reason recommendation (3) is not adopted.)
(9) Aileron controls to operate in the same section as the interaileron strut.

Group II.—Recommendations Relative to Overhangs.

(These recommendations may be ignored unless the overhang is very long.)

(10) Balance of masses of each over-hang (including corresponding portion of aileron) about its flexural axis.
(11) Flexural axis close to axis of independence.

8. *Notes on the Recommendations.*—Recommendation (1). A proportionate increase of all elastic stiffnesses raises the critical speeds. In the case of biplanes the stiffness of the staying is naturally of great importance.

Recommendation (2).—A properly designed irreversible control completely eliminates flutter involving the ailerons. All other recommendations relative to the ailerons can then be ignored.

Recommendation (3).—This recommendation is of the greatest importance, and should be interpreted strictly, since partial mass balance may be of no benefit. Allowance must be made for the mass of the interaileron strut and other appendages of the aileron. Interconnection of the ailerons by a wire instead of a strut may be of assistance here on account of the smaller mass of the wire.

Recommendation (4).—All parts of the control system which move with the ailerons contribute effectively to the moment of inertia of the aileron. All such parts should, therefore, be as light as possible.

Recommendation (5).—This measure assists to minimise some of the aileron couplings, but it must not be considered as an effective alternative to recommendation (3).

Recommendation (6).—An artificial damping device, if employed, should be of the fluid friction or electrical type. The use of solid friction is viewed as objectionable.

Recommendation (7).—Very close approach to the condition of aerodynamical balance is considered dangerous. However, experiments described in § 28 show that an aileron hinged at about 0·2 of the chord from its leading edge may be quite satisfactory.

Recommendation (8).—The reasons for this recommendation are given in § 4 and § 5. It is of particular importance when one of the overhangs is long and the other short, and the ailerons are mass balanced.

Recommendation (9).—This measure results in the elimination of certain couplings, and is also clearly mechanically sound.

Recommendations (10) and (11).—Full explanations of these recommendations are given in R. & M. 1155.

TORSIONAL VIBRATION OF CRANKSHAFTS. A DESCRIPTION OF THE R.A.E. MK. III TORSIOGRAPH. By the Staff of the Engine Experimental Department, Royal Aircraft Establishment. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1248. (E. 32.) (5 pages and 6 diagrams.) November, 1928. Price 1*s.* net.

Torsional vibration in an engine manifests itself in a winding and unwinding of the crankshaft-airscrew system under the intermittent power impulses of the cylinders, and the theory is now sufficiently advanced to enable fairly accurate predictions to be made of the synchronous speeds of the crankshaft system in an engine, provided the stiffness of the system is known. The stiffness may be obtained by calculation or by direct experimental means, which involve twisting the shaft under static conditions.

The R.A.E. torsiograph comprises an optical system whereby the torsional vibrations of a crankshaft may be magnified and recorded in the form of a polar diagram on a photographic plate. These "torsiograms" may be analysed to give information on the frequency and amplitude of the vibrations at the engine speed, considered together with the maximum, mean and minimum torque transmitted by the shaft.

THE INTERFERENCE OF A WIND TUNNEL ON A SYMMETRICAL BODY. By C. N. H. Lock, M.A. R. & M. No. 1275. (Ae. 421.) (20 pages and 8 diagrams.) October, 1929. Price 1*s.* net.

The problem of determining the magnitude of the interference of wind tunnel walls on a symmetrical body has recently become more important owing to the increased size of models tested. Examples at the National Physical Laboratory are the two-dimensional Joukowski profiles tested by Fage and Falkner,* and the three-dimensional bodies of revolution tested by Ower, Townend and Hutton† for the Interference Sub-Committee. This increase of size has been made possible partly by the elimination of the pressure drop in the No. 3 7-ft. tunnel: previously the correction for pressure drop so greatly exceeded the direct effect of the tunnel walls on velocity that the latter could reasonably be ignored. It is the correction on velocity in the absence of pressure drop which forms the subject of the present report.

The two-dimensional case has been placed on a sound basis by Fage, in T.2720.‡ This report contains the results of experiments in a model tunnel of varying width, which he analysed by means of the theory of a Rankine Oval (source and equal sink) in a channel, given by Sir Richard Glazebrook.§ No experiments on the three-dimensional case are at present available, but the corresponding theory of a Rankine "Ovoid" (source and equal sink) in a closed circular tunnel is given by Professor Lamb.¶ This solution involves the use of an infinite series whose convergence becomes slow in certain cases. The three-dimensional case may be of some importance in the future owing to the increased desirability of using large-size streamline models suggested by the researches of Professor Jones‖ and in connection with experiments on airscrew-body interference.

In the present paper it is shown that a first approximation to the two-dimensional theoretical solution can be obtained by the method of images. This solution has the advantage that it can be applied to any symmetrical cylinder for which the solution in an infinite stream is known: it also avoids the somewhat laborious calculations made by Fage in 3.

* R. & M. 1242. Experiments on a series of symmetrical Joukowski sections. Fage and Falkner.

† T. 2658 (Unpublished). Interference effects between a streamline body and certain objects near it. Ower, Townend and Hutton.

‡ R. & M. 1223. On the two-dimensional flow past a body of symmetrical cross-section mounted in a channel of finite breadth.—Fage.

§ Sir Richard T. Glazebrook. Trans. Inst. Nav. Arch., 1990 (p. 155).

¶ R. & M. 1010. On the effect of the walls of an experimental tank on the resistance of a model. H. Lamb.

‖ R. & M. 1199. Skin friction and the drag of streamline bodies. B. M. Jones.

FLOW THROUGH PIPE ORIFICES AT LOW REYNOLDS NUMBERS. By F. C. Johansen, B.Sc., A.M.I.Mech.E. R. & M. No. 1252. (Ae. 402.) (24 pages and 16 diagrams.) June, 1929. Price 1*s.* 3*d.* net.

The flow of water through a sharp-edged circular orifice mounted concentrically in a glass pipe has been observed, by the introduction of colour, over a range of low Reynolds numbers. At very low speeds the flow pattern is symmetrical about the orifice. As vd/ν is steadily increased, a jet is formed downstream of the orifice, at low speeds rapidly divergent, but growing nearly cylindrical at greater flows. Vorticity makes a gradual appearance, first as filaments round the boundary of the jet and eventually as a train of vortex rings, which are formed with a regular frequency and travel about five pipe diameters downstream before merging in a general turbulence. With further increase of flow the turbulence approaches the orifice, and the vortex system is dissipated almost immediately.

In a comparable series of experiments the pressure distribution along the pipe walls near an orifice has been studied. By the use of oils of high viscosity discharge coefficients for a range of orifice diameters have been determined down to values of Reynolds number less than unity. It is possible to relate many of the characteristics of the pressure distribution to features observed visually. Thus, the first appearance of vorticity in the jet issuing from the orifice corresponds to a maximum value of discharge coefficient, whilst the dissipation of the vortex system about 5 pipe diameters downstream of the orifice corresponds to a position of maximum pressure restoration.

Attention has been particularly directed to variations of all the features observed, due to variations of orifice diameter ratio. Finally, the numerical values of discharge coefficient determined provide data for the use of the pipe orifice as a flow meter.

STABILITY DERIVATIVES OF THE BRISTOL FIGHTER. By A. S. Halliday, B.Sc., Ph.D., D.I.C. R. & M. No. 1277 (Ae. 423.) (11 pages and 20 diagrams.) October, 1929. Price 1*s.* net.

In response to a request from the Aeronautical Research Committee, a standard set of derivatives applicable to the Bristol Fighter aeroplane has been compiled in order that all future calculations with respect to this machine may be directly comparable. The data used for the calculations of the various derivatives have been collected from various Reports and Memoranda, a list of which is given at the end of the report.

There is some ambiguity regarding the values of the rotary derivatives Lp, Lr, Np and Nr, and it is proposed that the standard values of Lp/A, Np/C and Nr/C be those derived from the continuous rotation experiments. The recommended values of L_r/A, as far as 12° incidence, are those obtained by calculation on the assumptions of elliptic loading distribution; above 12° the values from continuous rotation experiments are proposed. Until actual measurements have been made to determine Z_q, approximate estimates are given which are considered sufficient for the usual stability calculations.

ON THE DISTRIBUTION OF PRESSURE OVER A SYMMETRICAL JOUKOWSKI SECTION AT HIGH SPEEDS. By T. E. Stanton, F.R.S. R. & M. No. 1280 (Ae. 426). (3 pages and 2 diagrams.) October, 1929. Price 4*d.* net.

The observations were undertaken at the request of Professor G. I. Taylor for the purpose of obtaining information as to the speeds at which a marked change takes place in the low speed pressure distribution over an aerofoil.

Joukowski Section No. 3 of R. & M. 1241 was chosen for test in the 3·07-in. high-speed wind channel, the model of 0·8-in. chord was supported in a symmetrical position, and extended over the whole width of the channel. The pressure distribution over the central section was determined at values of the mean speed between 0·25a and 0·71a.

At speeds up to half that of sound the deviation of the pressure distribution from the theoretical appeared to increase with speed, but remained small. At speeds above half the velocity, the divergence increased at a greater rate, and this was maintained up to a speed of 0·71a, which was the greatest speed attained in the experiments.

"CORNERING" AT HIGH SPEEDS. By W. G. Jennings B.Sc. Communicated by the Director of Scientific Research Air Ministry. R. & M. No. 1281. (Ae. 427.) (9 pages and 7 diagrams.) May, 1927. Price 9*d.* net.

The conditions under which racing with modern high-speed aircraft is carried out are such that the time lost at the various turning points along the course has a considerable influence on the mean speed maintained throughout the race. It was therefore considered desirable to investigate the problem of "cornering" at high speeds with a view to determine the most efficient method of carrying out the manœuvre.

The time required for an aircraft to cover a given course has been calculated when various methods of circling the pylons are employed. A few tests have been carried out on an aeroplane in flight.

From the theoretical point of view it would appear that it does not pay to gain or lose height on the turn, but certain practical considerations may make a small gain of height a necessity.

A "tight" turn is better than a loose open turn, but it is doubtful whether any advantage is to be gained by allowing the lift force on the wings to exceed five times the weight of the aeroplane.

The best possible mean speed over the course considered is about 3 per cent. below the top speed of the aeroplane.

FULL-SCALE EXPERIMENTS ON HIGH TIP SPEED AIRSCREWS. COMPARATIVE PERFORMANCE TRIALS OF THREE AIRSCREWS OF DIFFERENT SECTIONS. By W. G. Jennings, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1282 (Ae. 428). (6 pages and 5 diagrams.) September, 1929. Price 6*d.* net.

The present report continues the investigation on a high tip speed airscrew described in report R. & M. 1173*, and deals with the comparative performance trials of three airscrews of different sections, with thickness/chord ratios of 0·10 and 0·12 and of R.A.F. 28 section.

The full-scale tests indicate that the profile drag losses due to high tip speeds are reduced considerably by decreasing the thickness/chord ratio of the conventional airscrew section from 12 per cent. to 10 per cent., and that these losses may be reduced still further by using a R.A.F. 28 section instead of the conventional section of the same thickness (10 per cent.). This comparative result is in agreement with the wind-tunnel tests, but no absolute values of the losses can be deduced from the full-scale tests.

It would also appear that the change in efficiency corresponding to a change in thickness/chord ratio of a conventional airscrew section deduced from the model tests is in good agreement with the full-scale results, but that the large increase of efficiency of the Joukowski section over that of the conventional section of the same thickness given by the model results, is not supported by the full-scale tests, which show only a small increase.

* R. & M. 1173. Full-scale Determination of the Effect of High Tip Speeds on the Performance of an Airscrew. By W. G. Jennings.

THE EFFECTS OF TURBULENCE AND SURFACE ROUGHNESS ON THE DRAG OF A CIRCULAR CYLINDER. By A. Fage, A.R.C.Sc., and J. H. Warsap. R. & M. No. 1283 (Ae. 429), (8 pages and 7 diagrams.) October, 1929. Price 6*d.* net.

It is well known that there is a sensitive range of high values of the Reynolds number over which the airflow around a smooth circular cylinde r

undergoes a marked change, and for which the drag coefficient falls from 0·6 to 0·2 approximately. This phenomenon is intimately related with changes of flow in the thin boundary layer situated close to the surface of the cylinder, and in particular to the transition from laminar to turbulent flow which occurs at or near the region where the layer separates from the surface.*

A study has been made of the effects of turbulence artificially created in the general stream, in the roughness of the entire surface, and finally in the size of local excrescences formed by generator wires. These methodical changes are shown to produce orderly changes in the drag, and it is concluded that the flow considered, although sensitive to such extraneous disturbances, is not of a critical nature.

* See R. & M. 1179. The Airflow around a Circular Cylinder in the Region where the Boundary Layer Separates from the Surface. By A. Fage.

PRESSURE PLOTTING A STREAMLINE BODY WITH TRACTOR AIRSCREW RUNNING. Part II.—AIRSCREW IN REAR POSITION. By C. N. H. Lock, M.A., and F. C. Johansen, B.Sc., A.M.I.Mech.E. R. & M. No. 1284. (Ae. 434.) (17 pages and 9 diagrams.) September, 1929. Price 1*s.* net.

A previous report, R. & M. 1230,* described the experiment of pressure plotting a streamline body with tractor airscrew running. The present report deals with a repetition of these experiments with the airscrew shifted to a position 6 in. nearer the tail of the body. The two positions of the airscrew in the body correspond to the forward and rear positions of R. & M. 1030†, in which the proportion of the diameter of the airscrew shielded by the body was 0·25 and 0·46 respectively. The experiments in the main verify the prediction in R. & M. 1120‡ that the large pressure drag observed in the forward position should disappear in the rear position.

By comparison with the screw in the forward position, the present results show a smaller increase of pressure drag with thrust over the forward half of the body. As regards efficiency and spoiling effect, little difference was observed, the forward position having a slight advantage. The skin friction drag, and suction on the tail are both sensibly independent of the position of the airscrew.

* R. & M. 1230. Pressure plotting a streamline body with tractor airscrew running.—C. N. H. Lock, M.A., and F. C. Johansen, B.Sc., A.M.I. Mech.E.

† R. & M. 1030. Experiments with a family of airscrews, including effect of tractor and pusher bodies. Part 4. On the effect of placing an airscrew in various positions within the nose of a streamline body.—Bateman, Townend and Kirkup.

‡ R. & M. 1120. Analysis of experiments on an airscrew in various positions within the nose of a tractor body.—Lock.

RECORDS OF THE LATERAL MOTIONS OF A STALLED BRISTOL FIGHTER AEROPLANE WITH SLOTS UPON THE UPPER WING TIPS. EXPERIMENTS MADE IN THE CAMBRIDGE UNIVERSITY AIR SQUADRON. By Prof. B. M. JONES, M.A., A.F.C., F.R.Ae.S., Flight-Lieut. C. E. Maitland, D.F.C., R.A.F., and R. P. Alston, B.A. R. & M. No. 1286 (Ae. 436). (8 pages and 39 diagrams.) July, 1929. Price 9*d.* net.

These experiments are in continuation of those described in R. & M. 1181.* The aeroplane was the same except that the top plane was replaced by one with wing tip slots and the fin and rudder were replaced by the larger type now standard on Bristol Fighters. The increased fin and rudder gave appreciably larger yawing moments in normal flight, but in stalled flight the difference, according to wind tunnel measurements, was slight, and is considered to have no important bearing on the results.

The slots which lay along the leading edges of the upper wings in front of the ailerons, could be either fixed permanently open or varied in sympathy with the ailerons, Two alternative inter-connecting mechanisms were available, which gave different relations between slot opening and aileron position.

The addition of slots to the Bristol Fighter, in any of the forms, has profoundly modified and improved its behaviour in the stalled state. The fixed open slots make the stalled aeroplane very stable laterally, but give little aileron power. The slots operated by the ailerons from a position in which the gap is 0·6 in. bring the lateral motion just on the unstable side of neutrality and give appreciable aileron control which, however, is insufficient to cope definitely and quickly with certain forms of disturbance. All the records in which ailerons are moved suggest that they generate powerful yawing moments in the undesirable sense—retarding the wing that they are trying to raise. This causes large changes of azimuth when attempting to correct a lateral disturbance—a most objectionable feature if the controls are to be used for anything more than merely to bring the aeroplane on to an even keel. It is possible that this large yawing moment arises from the aileron on the lower wing, in front of which there is no slot.

Further experiments are contemplated in which slots will be provided on all four wing tips.

* "Instrumental Records of the Lateral Motions of a Stalled Bristol Fighter Aeroplane," by Prof. B. Melvill Jones and Flight-Lieut. C. E. Maitland. September, 1928.

MECHANICAL PROPERTIES OF PURE ALUMINIUM AND CERTAIN MAGNESIUM ALLOYS IN THE WROUGHT CONDITION (Continued). MECHANICAL PROPERTIES OF "ELECTRON" ALLOY. By H. J. Tapsell, A.C.G.I., S. L. Archbutt, F.I.C., and J. W. Jenkin, B.Sc., Ph.D. Work Performed for the Engineering Research Board of the Department of Scientific and Industrial Research. R. & M. No. 1285 (M. 66.) (9 pages and 4 diagrams.) February, 1926. Price 9*d.* net.

The use of magnesium and its alloys is of considerable interest to the Aeronautical industry, and the present Report describes the continuation of the investigation in progress at the National Physical Laboratory on the mechanical properties and the microstructure of certain magnesium alloys. In this case the particular sample under investigation was commercially supplied rolled rod, of one of the "Electron" series of alloys, having the following analysis :—

Copper	0·22
Silicon	0·14
Aluminium	0·15
Zinc	4·38
Lead	Nil
Calcium	Nil
Magnesium (diff.)	95·11
	100·00

The mechanical properties determined included :—

On material as received :—

Tensile tests at normal rate of loading, at air temperature, 150° C., 350° C.

Impact tests at air temperature, 150° C., 250° C., 350° C.

Hardness tests at air temperature, 150° C., and 250° C.

Fatigue tests at air temperature and at 150° C.

On material annealed at 350° C. for 5 hours.

Tensile tests at air temperature.

The mechanical test results are summarised in the following table :—

	16° C. (approx.)	150° C.	250° C.	350° C.
Stress at limit of proportionality, tons/in.²	4·5	—	—	—
Do. annealed 350° C.	2·7	—	—	—
*Proof stress (A), tons/in.²	12·2	—	—	—
Do. annealed 350° C.	8·1	—	—	—
†Proof stress (B), tons/in.²	14·4	—	—	—
Do. annealed 350° C.	8·8	—	—	—
Yield stress, tons/in.²	17·0	8·9	2·9	—
Ultimate stress, tons/in.²	17·7	10·3	3·75	1·50
Do. annealed 350° C.	15·5	—	—	—
Elongation, per cent. on 2 ins.	12·8	52	70	97
Do. annealed 350° C.	14·0	—	—	—
Reduction of area, per cent.	16	58	87	99·5
Do. annealed 350° C.	10·5	—	—	—
Modulus of elasticity, lbs/in.²	$6·1 \times 10^6$	—	—	—
Do. annealed 350° C.	$6·0 \times 10^6$	—	—	—
Energy to fracture in impact (Charpy) ft.lbs.	0·51	1·35	1·66	0·45
Hardness (Brinell)	55	35	12	—
‡Limiting fatigue range, tons/in.²	±6·4	±4·0	—	—

On a strength/weight basis, the material is comparable in limit of proportionality, ultimate stress and fatigue range with duralumin of 27 tons tensile strength. It is, however, very much softer. At elevated temperatures the tensile strength at a normal rate of loading falls very rapidly with rising temperature. The hardness also falls rapidly. Up to 250° C., there is a marked increase in toughness, but above this temperature a rapid decrease. As regards fatigue the material is not much inferior on a strength weight basis, to duralumin, up to temperatures rising to 150° C. At temperatures of the order of 250° C., the material is very much weaker and softer than duralumin.

* Involving a permanent extension of 0·10 per cent. of the gauge length.
† Involving a permanent extension of 0·15 per cent. of the gauge length.
‡ Haigh. 10 million reversals basis.

THE DETERMINATION OF THE WATER RESISTANCE OF SEAPLANES. By H. M. Garner, M.A., L. P. Coombes, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1289. (Ae. 438.) (10 pages and 2 diagrams.) October, 1929. Price 9*d.* net.

The measurement of the water resistance, full scale, of the hulls and floats of seaplanes is a problem that has occupied the attention of research workers in several countries, but no great success seems so far to have resulted. A number of different methods have been put forward, and these are critically examined in order to determine which method is likely to give the most accurate results.

One direct method is to support the hull or floats by means of springs on to some rigid part of the seaplane structure, and to measure the deflection of the springs under load. Another is to measure the stresses in the undercarriage members by means of extensometers. This latter has been applied to a fuselage, admittedly a more complicated structure than an undercarriage, at the R.A.E. without success.

The indirect determination of the water resistance by measurement of the forward acceleration and estimates of the airscrew thrust and air drag has been attempted at M.A.E.E. on a "Southampton" aircraft.

Direct and indirect methods are examined, and calculations are made to determine the accuracy which can be expected if the tests are done under good weather conditions.

A direct method is likely to prove the most accurate, if a satisfactory mechanism can be designed. In the indirect methods, errors, some of them important, can arise from different sources, and a high order of accuracy must be aimed at in certain recording instruments. A thrustmeter is essential for use with the indirect methods.

It is suggested that the "parallel motion" scheme for measuring the water resistance directly should be designed and tested. The indirect scheme, using an air log for measuring the forward acceleration, is being tested at M.A.E.E. In spite of a number of disadvantages of this scheme, it is considered that it should be further developed. The development should include the design of a thrustmeter.

SOME GENERALISED CURVES FOR THE ACCELERATED MOTION OF AN AEROPLANE. By H. Glauert, M.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1291. (Ae. 440.) (11 pages and 8 diagrams.) November, 1929. Price 9*d.* net.

Problems frequently arise involving the rate of acceleration of an aeroplane in a steep dive, the rapidity with which the aeroplane can pass from horizontal flight to a dive, and the rate of acceleration or deceleration in horizontal flight. An attempt has therefore been made to obtain some generalised solutions of these problems, which can be used as preliminary estimates before exact calculations of any special problem are made.

Approximate calculations have been made on the assumption that the rate of revolution of the engine and airscrew is maintained constant during the manœuvre, and the results are given in the form of generalised curves which can be used for any aeroplane. The results depend on two constants only of the aeroplane, *i.e.*, its top speed V_0 of horizontal flight and the corresponding drag-lift ratio ϵ. All speeds are given as multiples of this fundamental speed V_0 expressed in feet per second, and all distances as multiples of the fundamental length V_0^2/g.

STALLED FLIGHT TESTS OF A MOTH FITTED WITH AUTO CONTROL SLOTS AND INTERCEPTORS. By E. T. Jones, M.Eng., Flt.-Lt. C. E. Maitland and Ft.-Lt. W. E. Purdin. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1292 (Ae. 441). (3 pages and 2 diagrams). November, 1929. Price 4*d*. net.

Messrs. Handley Page, Ltd., have developed the interceptor as a promising means of spoiling the slot action on a downward moving wing. The Handley Page interceptor is a hinged flap operated by the control column, so that when the latter is hard over the interceptor is normal to the wind in a position slightly to the rear of the open slat. At Messrs. Handley Page's invitation, pilots of the R.A.E. visited the firm's works in order to test this device as fitted to a Moth aeroplane with auto slots.

The lateral control and stability in stalled flight and the effect of the interceptors in spins, and aerobatic manœuvres were investigated.

The lateral stability of the aircraft when stalled was good and the lateral control very effective; the lateral control reduced the rate of rotation in spins to the left and right but was not sufficient to bring the aeroplane out of a spin against the rudder. The aircraft could be manœuvred with greater rapidity than the standard Moth fitted with auto control slots and appeared to have no vices.

A Siskin aeroplane is being fitted with interceptors at the R.A.E. and some model experiments are being made upon the effect of interceptors in getting out of fast spins.

EXPLORATION OF THE FLOW NEAR THE SCREW PROPOSED FOR THE N.P.L. COMPRESSED AIR TUNNEL. By C. N. H. Lock, M.A., and A. R. Collar, B.A., B.Sc. R. & M. No. 1293. (Ae. 442.) (10 pages and 6 diagrams.) January, 1930. Price 9*d*. net.

The main object of the following experiments, which are believed to be the first of their type, was to obtain an experimental value for the efficiency of the fan designed for the N.P.L. compressed-air tunnel. The only reasonable definition of the efficiency of a tunnel fan involves the definition of the "useful power" as a mean value of the product of the thrust into the velocity through the disc of the fan (airscrew). For this purpose it is desirable to measure the variation with radius of the thrust grading, and also of the axial component velocity. The efficiency as here defined would seem to represent a reasonable criterion of the good qualities of the tunnel airscrew; it is comparable with the efficiency of an ordinary airscrew, except that the power loss corresponding to the difference between the axial velocity through the airscrew disc and the forward speed of the aircraft is not present in the case of the tunnel airscrew. The efficiency of the latter is therefore to be expected to be higher than that of the ordinary airscrew.

The observed torque, torque grading and thrust grading were compared with values calculated by strip theory on the basis of the observed axial component velocity; the agreement is fair. Corresponding values of the efficiency are 86·5 per cent. experimental, and 89·2 per cent. by strip theory, with a probable increase of 1·6 per cent. on doubling the scale. The torque predicted for the full-scale screw is in sufficiently close agreement with requirements.

CENTRE OF PRESSURE TRAVEL OF SYMMETRICAL SECTION OF SMALL INCIDENCE. By F. B. Bradfield, Math. and Nat. Sci. Triposes. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1294. (Ae. 443.) (9 pages and 8 diagrams.) December, 1929. Price 9*d*. net.

In testing all-moving rudders of R.A.F. 30 section on the Virginia, Messrs. Vickers (Aviation), Ltd., found that at small angles the rudders were unstable, even when the hinge position was considerably ahead of 0·25*c*; and they have used a spring device to counteract the instability.

Some wind tunnel tests have been carried out at the Royal Aircraft Establishment, mainly during August, 1929, to find under what circumstances this destabilising travel of the centre of pressure occurs. The models tested were rectangular monoplanes, of 8-in. chord, and the experiments consisted in measuring pitching moments about hinges at 0·20*c* and 0·25*c* from the leading edge.

All the sections tested were found to be unstable when hinged at 0·25 c. and to give neutral stability at small angles: the hinge positions found at 80 ft./sec. varied between 0·165 c. and 0·225 c. for R.A.F.27, and 30 sections with aspect ratios of 1, 2 and 4. At 50 ft./sec. the hinge positions were slightly further forward. Cutting off the trailing edge produced little improvement in the travel of the centre of pressure. An analogous phenomenon was observed with R.A.F.34 section.

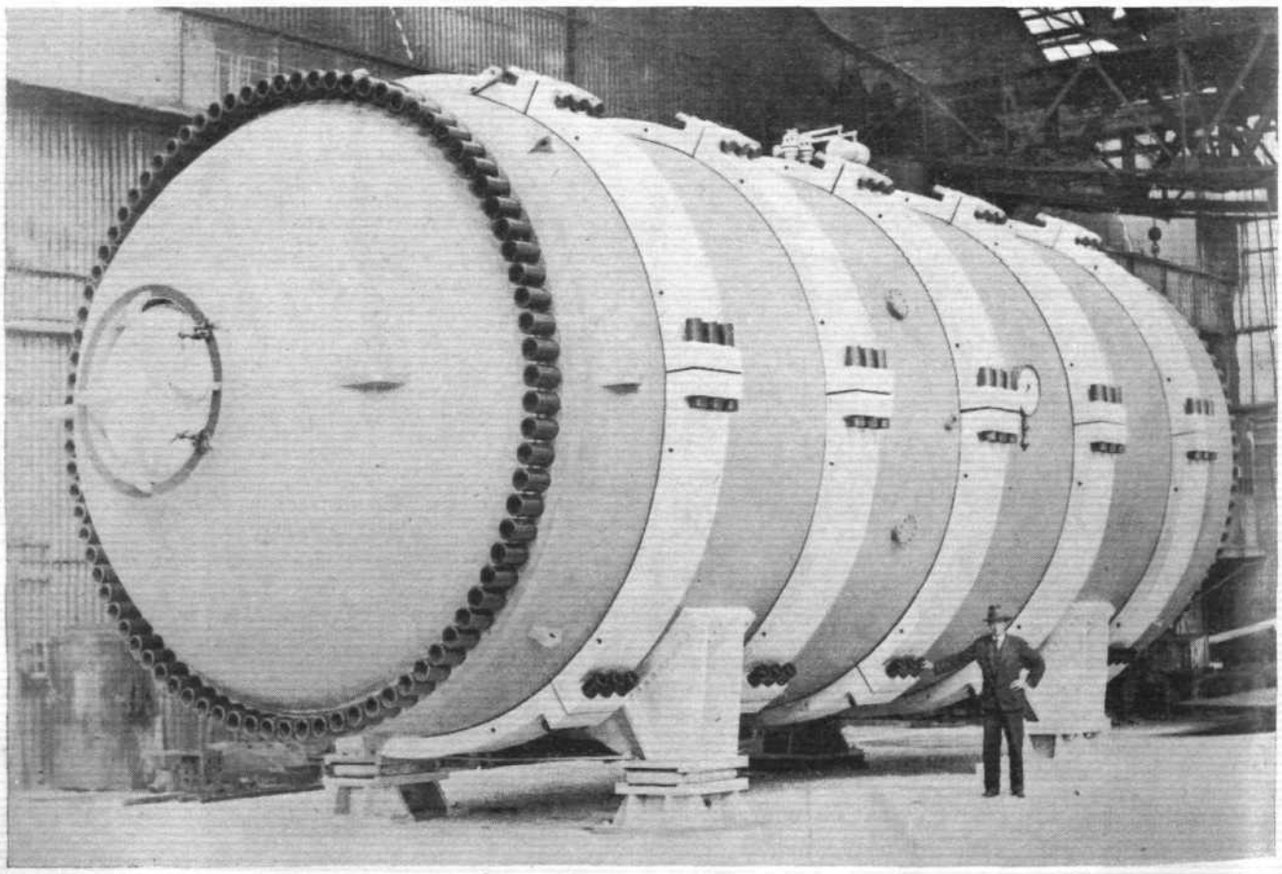
For the rudder of aspect ratio 1 between tailplanes, the centre of pressure movement is from 0·235 c. at $k_1 = 0$ to 0·249 c. at $k = 0·3$. This range is about the same as for a rudder of aspect ratio 4 when tested alone.

MAXIMUM LIFT COEFFICIENT OF "STARLING" WITH CLARK YH WINGS. By R. P. Alston, B.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1295. (Ae. 444.) (2 pages and 2 diagrams.) December, 1929. Price 3*d*. net.

The Clark YH is an American section developed from Clark Y be reflexing the trailing edge. It is described, together with tests on it in the variable density tunnel, in N.A.C.A. Technical Note No. 240.* At the request of Messrs. Armstrong Whitworth Aircraft, Ltd., and as no previous full-scale tests of Clark YH section being known the maximum lift coefficient has been determined.

The value of the lift coefficient has been determined between 9° and 24° incidence by measuring the airspread on engine-off glides, using a trailing static head and swivelling pitot head. The value of k_L maximum is 0·51, and is lower than would be expected from experiments made in the N.A.C.A. variable density wind tunnel on a monoplane wing which gave k_L maximum = 0·65.

* The N.A.C.A. CYH Airfoil Section.—G. J. Higgins.



THE N.P.L.'s NEW DENSITY TUNNEL: Made by John Brown & Co., Ltd., of Sheffield, this tunnel has a length of 50 ft. and an inside diameter of 17 ft. The finished weight is 250 tons. The steel rings and domed ends were made by Firth & Sons, Ltd.

PRIVATE FLYING AND CLUB NEWS

THE SHANKLIN MEETING

THE Shanklin Meeting on Thursday, June 12, was a most enjoyable show of the more informal type. Some twenty visiting machines arrived and the populace of the "Island," who are not, as yet, as accustomed to aircraft as are those who merely live in England, were able to see such diverse types as Widgeon, Avian, Klemms, Breda, Avro and various species of Moths.

The authorities had very wisely secured the services of Mr. Jeffs, with the result that all flying was carried out safely, and with his usual tact he ensured a smoothly run traffic control without having to resort to harsh and dictatorial methods to prevent possible accidents. Such a job is no sinecure even though Mr. Jeffs is representing the Royal Aero Club, but it is absolutely essential that a firm control be exercised at these meetings if accidents are to be avoided, and certainly Mr. Jeffs has secured the cheerful co-operation of all concerned to ensure this.

In the unavoidable absence of Sir Sefton Brancker, Sir Alliot Verdon Roe opened the meeting with a short speech which was broadcast in the usual manner.

There was a fly-past of the various types of machines and a parachute drop by Mr. John Tranum, who went up with Col. Strange in a Spartan.

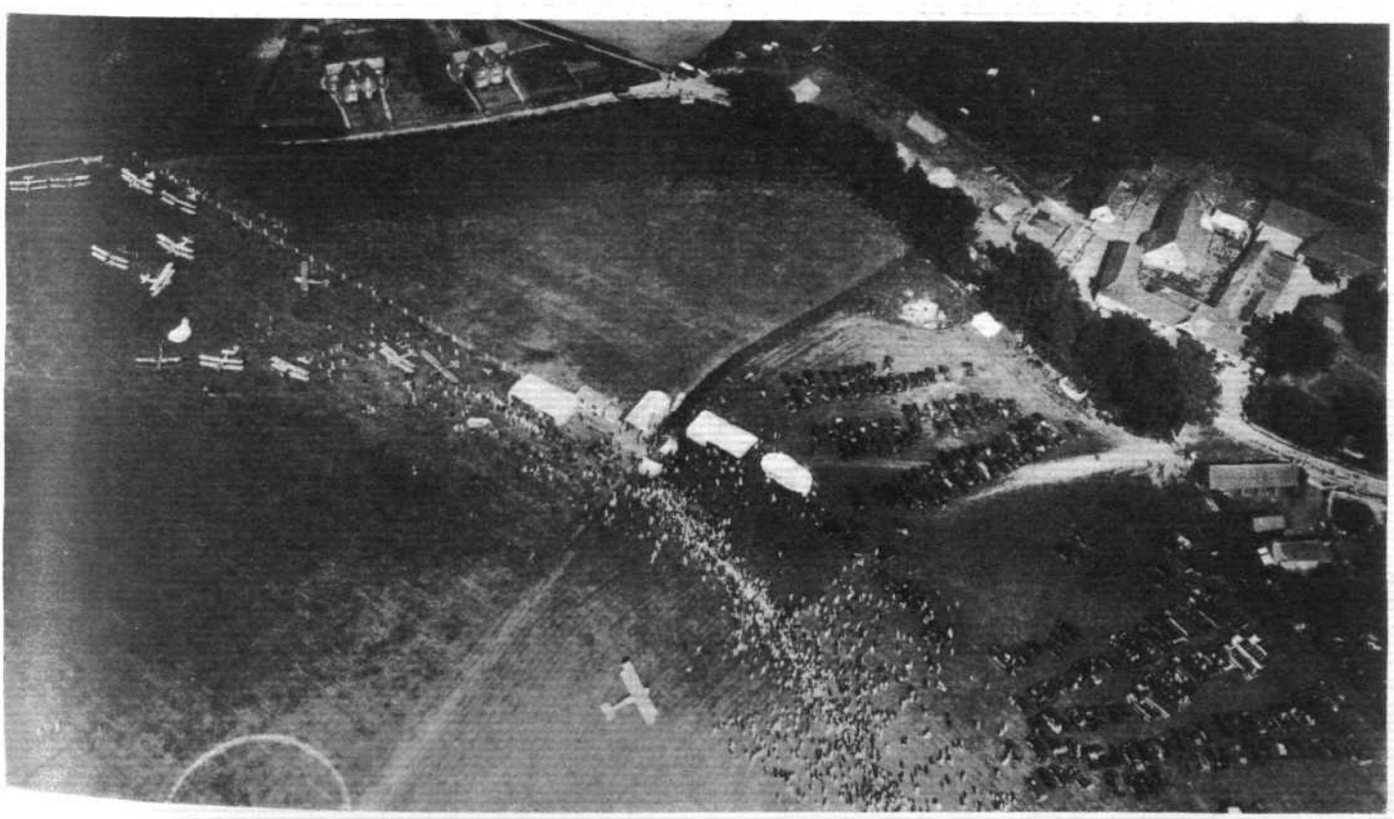
Mr. George Murray aerobated in Capt. Broad's special Moth, G-AALT, which is fitted for inverted flying, and Capt. Stack gave the indigenes an exhibition of the mastery which he has over his Hermes-Moth.

Sir Alliott Roe who opened the meeting. (FLIGHT *Photo.*)

There were two events which were in the nature of competitions, and these were "balloon bursting" and "bombing the car." The former was won by Mr. E. C. Brown in his beautiful dark blue and gold Gipsy-Moth, which colouring signifies his connection with W. B. Dick & Co., the makers of "Ilo" brand lubricating oils, while in the latter the first prize went to Mr. R. R. Bentley, who was flying the all-gold Hermes-Moth of the Shell Co. The prizes were received by Mrs. Brown and Mrs. Bentley, both of whom had accompanied their husbands during the competitions.

Capt. Ward who, together with his pilot, Mr. Woodward, runs Wight Aviation, Ltd., and is the founder of the Isle of Wight Flying Club, is to be congratulated on initiating the meeting, and we hope that its effect will react favourably on the other aviation interests in the "Island."

The I.W. Flying Club, wish to thank all those pilots and others, who took part in the Pageant. The Club quite underestimated the Island interest in flying, and can only hope that the unexpected strain put on the place by the public did not seriously interfere with the enjoyment of those who gave such a splendid display of flying to club members, and the large audience. It may



Mr. John Tranum landing in the machine park in the left-hand corner of the photograph. A portion of the cars which gathered at the meeting are seen on the right. (FLIGHT *Photo.*)

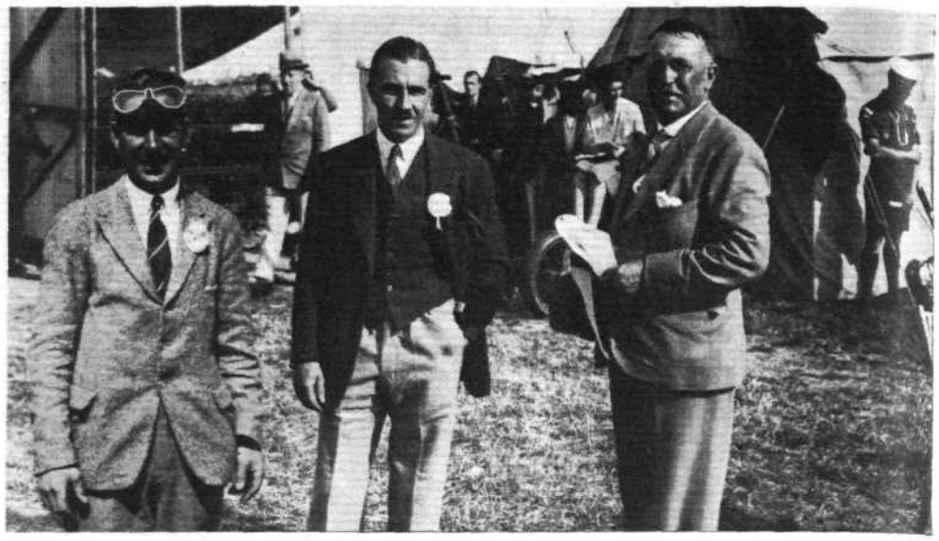
interest those concerned to know that their efforts were most fully appreciated, and already innumerable requests have been made from all over the Island for another such display.

IRISH GOVERNMENT TO ASSIST CIVILIAN FLYING?

The following motion is being introduced into the Dail (Irish Free State Parliament) shortly :—

"That, in the opinion of the Dail, the Executive Council should take immediate steps to assist the development of civil and commercial aviation ; and to provide adequate facilities for the training and certification of civilian pilots."

If this motion is passed, there should be a rapid increase in the membership of the Irish Aero Club, and also the formation of other clubs throughout the Free State.



Mr. Woodward (pilot), Capt. Ward (director), Mr. A. Murray (sec.) of Wight Aviation, Ltd. (FLIGHT *Photo.*)

An aerial view of the aerodrome at Shanklin. The white-posted corner on the left will subsequently be taken in as well. (FLIGHT *Photo.*)

THE SCOTTISH FLYING CLUB. The greatly improved flying time for the month of May represents an unqualified record by a very considerable margin over the previous best total, and testifies to the efficiency of the staff at the aerodrome.

Dual instruction, 86 hrs. 5 mins. ; non-qualified solo, 17 hrs. 50 mins. ; qualified solo, 42 hrs. 25 mins. ; joyrides and tests, 110 hrs. 25 mins. ; total, 256 hrs. 45 mins. Corresponding month, 1929—135 hrs. ; 1928, 13 hrs. 5 mins.

Cross-country flying, with landings, is now possible for qualified club pilots who have been approved by the chief instructor.

Landing grounds have been arranged at Symington, in Lanarkshire, by the courtesy of W. K. Jackson, Esq. ; near the hotel at Turnberry, by the kindness of R. J. W. Marshall, Esq. ; and at Turnhouse, Edinburgh, through the courtesy of the officer commanding the Auxiliary Squadron there.

THE ASHWELL-COOKE CHALLENGE CUP—June. The postponed competition for the Ashwell-Cooke Challenge Cup was held on Sunday, June 15, in very difficult weather. There was a wind of 30 miles an hour on the ground, and, unfortunately this deterred some of the competitors, and there was only a field of three. The order was as follows :—

1. Major C. L. Y. Parker, 62. 2. Mr. K. H. F. Waller, 54. 3. Mr. R. Dallas Brett, 40.

All the competitors flew G-EBQE. Mr. Waller had very bad luck on his second attempt, touching the ground about three yards before the mark, and thus being disqualified.

THE NORFOLK AND NORWICH AERO CLUB managed to get in 68 hr. 45 min. flying time from May 1 to May 24 ; this was made up by 24 hr. 10 min. dual instruction, 12 hr. 35 min. solo training, 22 hr. solo flying by "A" pilots, and 10 hr. joy-rides and tests.

The Club's official organ is *Wings*, a very live little publication which we advise all clubs to procure each month, for in it will be found not only club matters, but articles of general interest to all and much helpful matter to those who are learning to fly, such as an article this month in which F/O. R. Bunning, the club's instructor, advises all young and comparatively inexperienced pilots to :—

(1) Never start up an engine unless there is a pilot in the cockpit ; or, if that is not possible, without proper chocks in front of the wheels.
(2) Always run the engine up before taking off when starting from cold.
(3) Test both sets of ignition before taking off.
(4) Take off into wind.
(5) Avoid climbing turns near the ground.
(6) Take as long a run to get off as is available.

THE CLUB D'AVIATION LÉGÈRE WRIGHT-LÉON-BOLLÉE intimate that they will be very pleased to see any visitors by air from England during the LeMans meeting on June 21 and 22. They will be able to look after the machines and see to all fuel and oil requirements. The meeting is the occasion of the 24-hour Grand Prix and anyone attending by air will be certain of being well looked after.

THE HALDON DISPLAY which is being held on Saturday, June 21, should prove to be one of the most delightful meetings of the year. The locality is ideal for such an event, and under the able management of Mr. Parkhouse all visitors are certain of a good show and a hearty welcome.

The three competitions will be:—

(1) Rallye competition, open to "A" licence pilots, for the Teignmouth Air Trophy (to be held for one year, with replica for winner), and the Millbay Laundry Cup (also to be held for one year) as second prize.

Competitors must arrange their time of leaving to arrive between 12.30 and 1.30 p.m.; the place of departure should be the normal home aerodrome unless nearer than 100 miles from Haldon, in which case intending competitors must fly from an aerodrome more than 100 miles from Haldon. On leaving, a telegram must be sent by an observer, giving place and time of departure (to nearest second), also speed in miles per hour at which the journey will be completed, which declared speed must be within 30 m.p.h. of machine's top speed. Registration marking and pilot's name should be included. Competitors will be timed in as arriving, on crossing in flight, from east to west, a finishing line on the aerodrome marked so: X.....X. Formula to determine winner is $\frac{D}{X}$, where D equals distance from departure aerodrome measured on standard 10-miles-to-1-in. Ordnance map and X equals difference between declared and actual speed in miles per hour. Highest value for $\frac{D}{X}$ is winner; in event of tie, pilot flown longest distance wins.

Competitors flying from aerodromes south of a line drawn from Haldon to Felixstowe must make a course to Sidford (2 miles N.N.E. Sidmouth) as a turning point. This avoids any flying over the sea.

(2) Haldon Map-reading Competition, open to any pilot, for complete set of "A.A." flying maps of the British Isles, very kindly presented by the British Aviation Insurance Group, first prize; silver tankard, very kindly presented by Alexander Duckham, Ltd., as second prize.

This is a simple competition involving good course-keeping over about 10 miles, identifying an objective and returning to aerodrome. No passenger allowed. Details will be furnished to competitors on arrival.

(3) Balloon-bursting Competition, open to any pilot, for silver cup, very kindly presented by His Worship the Mayor of Torquay, Councillor E. H. Sermon, J.P.

The meeting is organised under the rules of the Royal Aero Club, with aerodrome control delegated to Capt. A. G. Lamplugh as flying control officer.

It is particularly requested that visiting pilots arrive before 2 p.m., as arrivals after that time will seriously interfere with flying programme.

Care should be exercised when approaching, as from 11 a.m. there will be joy-riding and exhibition flights in progress.

A HERMES AMPHIBIAN MOTH: The property of the Hon. A. E. Guinness, who is using it in Ireland, with Capt. G. A. Allison as his pilot.

Reporting

Immediately on landing, machines will be received by A.A. ground staff (under direction of Maj. McClure). Pilots should report immediately to reception car.

Throughout day no pilot must take off without permission of flying control officer.

Left-hand circuits must be rigidly observed.

No unauthorised stunting will be permitted.

Pilots must land according to landing tee.

Pilots arriving during R.A.F. display must not land until Air Force machines have landed.

Note.—All visitors by air will be under control of aerodrome control officer.

CANADIAN AERO CLUB.—Permanent headquarters for the newly formed Canadian Aero Club have been secured at 1,456, Drummond Street, Montreal, it is announced by officers of that organisation.

The Club will fill a long-felt need in Montreal and will link together all those interested in aviation and its development.

CLUB COLOURS.—Each large centre in New Zealand now has its own aero club established.

Frequently there are pageants and aerial meetings held wherever an adequate landing ground presents itself, and to the larger of these come aerial visitors from all over the country. In view of all the outside interest which attaches itself to these gatherings, it has been frequently suggested that each aero club has its own colour for its aeroplane, so that even in the home town the club aeroplane will be immediately distinguishable.

The following list has been suggested:—

Auckland	Yellow.
Hawke's Bay	Green.
New Plymouth	Light blue.
Wanganui	Aluminium.
Wellington	Brown.
Marlborough	Dark blue.
Canterbury	Red.
Otago	Orange.

This idea might be well worth considering here in England. It is true that many clubs already use colours, but the practice is not universal.

HARD LINES! Mr. R. Cazalet, who has flown his Widgeon (Hermes) in many races at air meetings, has always had an almost insuperable handicap. At Bristol he finished third only to find that he had been disqualified for slightly cutting the Filton corner. (FLIGHT *Photo.*)

CANADIAN ENTERPRISE : A metal Avro Avian (Genet Major) built in Canada. This aircraft has a wide range of utility in Canada, where the prevalence of lakes and other stretches of water make the seaplane much more practical than the landplane for such work as forest fire patrol and so on.

AN EAST AFRICAN LANDING GROUND. From our contemporary *Aeroken*, the official organ of the Aero Club of East Africa, we have gleaned the undermentioned details of Jinja Aerodrome. These we hope will be of use to our readers who will be flying in this part of the world during this summer.

The following are the complete particulars available regarding the Jinja Aerodrome :—

Class : Landing ground.

Longitude : 33° 46′ E.

Latitude : 0° 27′ N.

Province : Busoga Province of Uganda.

Local position : Three miles N.N.W. of Jinja.

Description : Size , 600 yards by 600 yards. Height above sea level, 4,000 ft. (approximately).

Soil : Loam.

Nature of surface : Grass, the ground is hard and the grass is kept short. Fit at all seasons. A ridge runs across the aerodrome from N.W. to S.E. The ground slopes sharply away to N.E. and N., and gently to S.W.

Nature of surrounding country : hilly and wooded. The ground drops away on the south and west to the lake and the Nile. On the east there is a hill rising to 100 ft. above the aerodrome. On the north the ground drops to a valley and then rises within half a mile to 1 mile to several hundred feet above the aerodrome. South and west are therefore the best directions of take off from.

Obstructions : The landing ground is surrounded by banana groves and the trees rise to a height of 30 ft. On the east side about 300 yards from the aerodrome a hill rises to about 100 ft. There is a grass hut on the landing ground about 100 yards from the south corner, used as a cricket pavilion.

Aerodrome markings : None.

Accommodation for machines : Nil.

Accommodation for personnel (passengers and crew) : Hotel in town.

Medical facilities : Hospital and English doctors in Jinja.

Repair facilities : Local garage workshops.

Stores : Motor spirit and oils available in Jinja.

Communications :

(*a*) *Railways :* Jinja, 3½ miles.

(*b*) *Roads :* Good road connects landing ground to main roads to all parts of Uganda and Kenya.

(*c*) *Motor transport :* Cars and lorries can be hired in town.

(*d*) *Telegraphic :* Telegraph office in town.

(*e*) *Telephone number :* None.

Meteorological : (*a*) Prevailing wind : March to May, S.E., but generally N.E. ; (*b*) Local mist fogs, etc. Mists in rainy season.

General : The dimensions are to be considerably increased towards N.W. and S.E. along fairly level ground and to S.W. over a not too steep downward slope. The slope towards N.E. is too great to make it worth while to extend in this direction. The extension can be made over cotton and scrub without touching many banana trees. The best take off (S.W.) is at present spoiled by the uphill run. Efforts will be made to get the enlargement so as to make the ground really safe.

THE ROMEO Ro.5 : With the 85-h.p. Fiat engine, the Romeo has a top speed of 105 m.p.h. It will shortly be manufactured under licence in this country.

THE MANSTON GARDEN PARTY

GROUP-CAPT. AND MRS. PINK were "at home" to the aviation world on Saturday, June 14, when they held a garden party at the R.A.F. Station at Manston, in Kent.

Some 800 guests had accepted invitations to be present, and among these were :—

Lord Carson.
Sir Sefton Brancker.
Air Vice-Marshal Sir Edward Ellington.
Air-Com. A. Warrington-Morris.
Air-Com. N. D. MacEwen.
Air-Com. Joubert de la Ferté.
Lieut.-Gen. H. M. Graham.
Lady Bailey.
Lady Pearson.
Col. the Master of Sempill.
Sir Francis McClean.
Sir Alan Cobham.
Lady Cobham.
Miss Spooner.
Capt. H. H. Balfour.

Between twenty and thirty private owners arrived in their own aircraft and one machine of each type present was parked in a special enclosure so that the guests could view the various machines easily.

Although there was no actual programme of flying to be interfered with, it was very regrettable that rain marred the afternoon, as tea cannot be taken comfortably in the open to the accompaniment of a steady drizzle, fine intervals, however, compensated the guests for this, and everyone spent a most enjoyable afternoon.

A large number of private owners and others who were flying to the party were unable to get through to Manston, owing to the low clouds, which in places came almost down to the ground, which accounted for the apparent paucity of aircraft present.

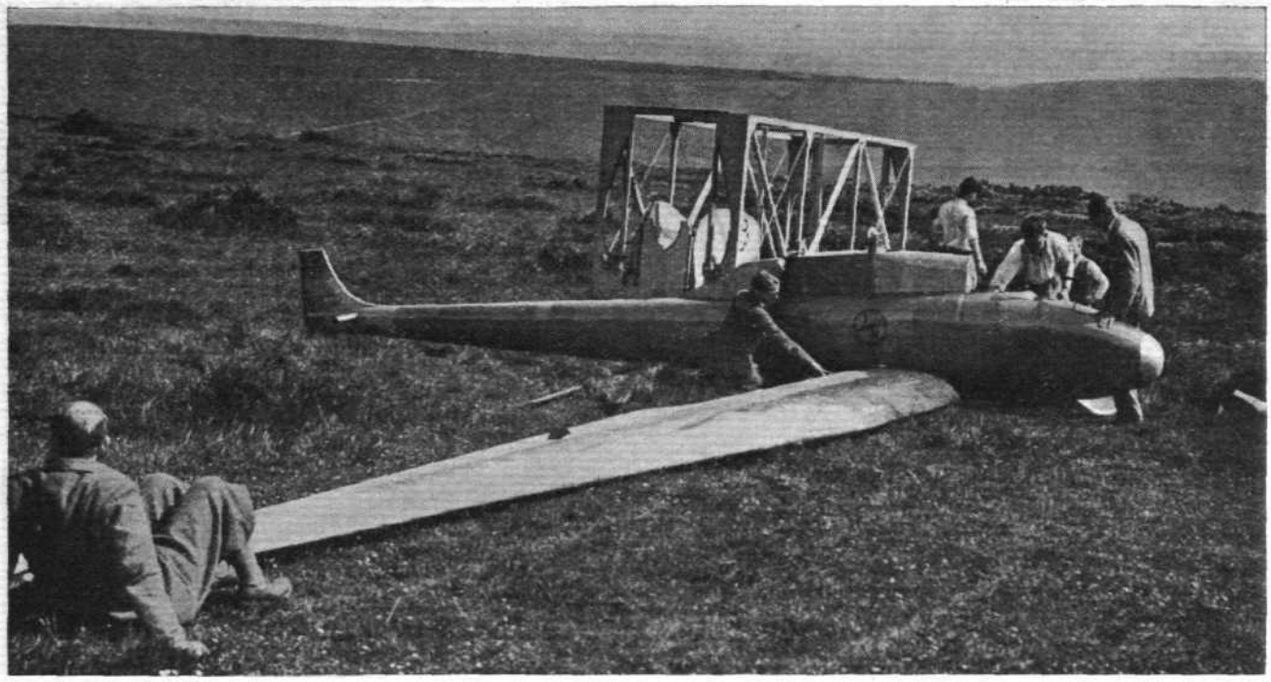
A pleasing outcome of such parties as this is the increased spirit of friendliness which is engendered between the R.A.F. and the outside flying fraternity.

Above, our photo. shows a few of the visitors, and below a formation of Victorias which flew over during the afternoon. (FLIGHT *Photos.*)

Group-Capt. and Mrs. Pink receiving the guests.
(FLIGHT *Photo.*)

A general view of the garden party at Manston. (FLIGHT *Photo.*)

GLIDING



The "Wien" being assembled at Firle. (FLIGHT *Photo.*)

HERR KRONFELD'S RECORD

ON Sunday, June 15, Herr Kronfeld made what must be one of, if not the, finest flight which has been made with a glider in this country.

He started from Firle Beacon, near Lewes, at about 5.30 p.m., and without any public announcement, although he had intimated his intention to a few who were actually helping him, he set off to fly direct to Bedhampton, near Portsmouth. During the day he had been giving a series of exhibition flights before a large crowd, and in the evening, no doubt he felt that he would be justified if he allowed himself the pleasure of a more experimental flight of the type which interests him so much.

He circled a few times and gained a height of about 1,700 ft., and then set off westwards at a fairly fast speed. Over Lewes he found that it was again necessary to circle round and gain height again, but once he reached the further range of the Downs it was all plain "sailing," and in in fact, he made such speed that the cars which were following him in the valley were unable to keep up with him, and after a flight lasting just under three hours, he landed at Bedhampton, a little over 70 miles from his starting point.

This flight was really remarkable for the fact that Herr Kronfeld set himself a definite goal and then reached it. It was not as if he had gone up to see where and in which direction he could get, but on the strength of his experience in the neighbourhood during the past two weeks, and in view of the favourable wind, he decided he would stand a very good chance of reaching Bedhampton, and he therefore set off. The site which he landed on is the one which had already been chosen for next week-end's demonstration, and there is no doubt that no finer way of advertising the fact could have been adopted than that he should have flown his glider there.

This week we publish a series of photos which show the careful arrangements which are made by Herr Kronfeld to transport the "Wien" from place to place. The trailer is mounted on a road chassis so that it can be taken along at ordinary touring pace behind his own car.

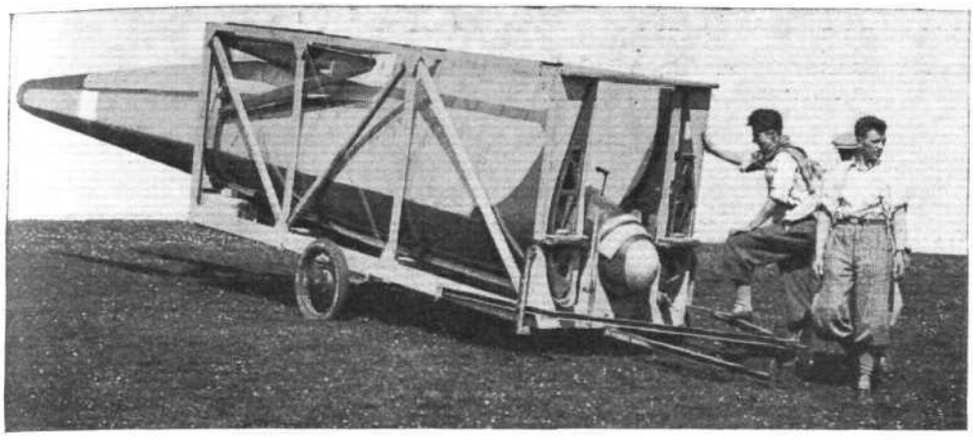
The "Wien" when dismantled into its component parts fits snugly in this crate with the wings standing on edge each side of the fuselage, while the tail units are placed on edge either side of the rear end.

The front end of the "Wien's" travelling crate. (FLIGHT *Photo.*)

The Wien itself is one of the most beautiful bits of aircraft construction that have been seen for some time, and such a glider is, of course, quite beyond the scope of the ordinary club.

Such advanced craft will be used by clubs as the skill of the members increases, but it is worth mentioning here that it is quite out of the question for club members to think that they will be able to skip the Zögling and Prüfling stages of instructional gliding.

If such a feeling is allowed to grow, there is no doubt that many accidents will occur, and the policy of all club executives should be slow and very sure. The preliminary stages on the Zögling type will probably be looked upon as unnecessary and boring by the more youthful and energetic members, but

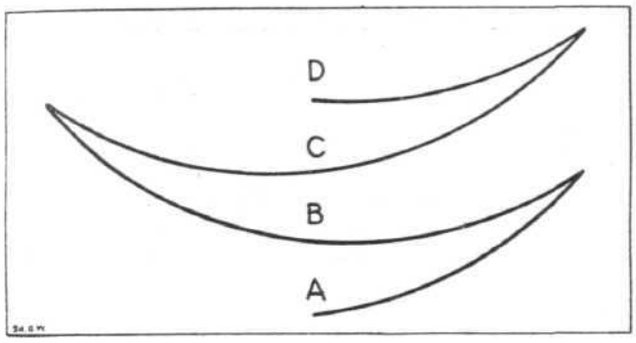


A side view of the crate, ready for towing.

(FLIGHT *Photo.*)

there is no other way in gliding which will lead to safety than the slow and sure one.

Accidents at this stage would do an immense amount of harm to the whole movement, and we must all do everything we can to avoid such a disaster. Therefore, learn to glide before you soar!



NOTE ON THE USE OF GUSTINESS IN GLIDING BY SIR GILBERT T. WALKER, C.S.I., Sc.D., F.R.S.

IN view of the recent increase of interest in gliding, the desire has been expressed for a non-mathematical statement of the way in which gliding may be maintained by taking advantage of changes in the velocity or direction of the wind.

We will, first of all, take a simple case. Consider a bird flying eastwards at his normal rate of 20 miles an hour, and let us suppose he knows that an east wind of 10 miles an hour will spring up and last for two minutes, followed by a west wind of the same strength for two minutes, then an east wind for two minutes, and so on. He will on the arrival of the east wind find himself at A travelling at 30 miles an hour relative to it, so that he can use up this pace to climb and, after wheeling round, to arrive at a point B above his starting place A after two minutes with a westward velocity of, say, 20 miles an hour relative to the wind, or 30 miles westwards relative to the ground. On the reversal of the wind he will find himself travelling at 40 miles an hour relative to it, and again he will use this in gaining height, returning to C, considerably above A, two minutes later with a velocity of 20 miles relative to the air. As before, this will become 40 miles relative to the wind after its reversal, and there will be another gain of height CD equal to BC; and so on.

The conditions here are frankly artificial; they only prepare the way for the general case. The essential fact is that the bird gains velocity relative to the air at B, C, D, when the wind reverses from following him to facing him; and we have now to consider gradual changes not sudden ones. If a bird when gliding horizontally at his normal pace through still air loses speed at a rate f (*i.e.*, has an acceleration f backwards) he will soon be in difficulties from loss of pace. But if the air itself has acceleration f' and the bird steers so as to meet f' his rate of loss of pace will become $f - f'$, so that if f' is greater than f the bird will actually *gain* velocity through **the air** at a rate $f' - f$. Now, horizontal gliding can go on as long as the velocity *relative to the air* is maintained; hence, gliding can be maintained indefinitely provided that on the average the acceleration of the air equals or exceeds f, and that the bird has enough air sense to steer always in the face of the acceleration. Now, a change either in the velocity or direction of the wind involves an acceleration, and so there will be enough acceleration if there is enough turbulence. Satisfactory evidence regarding the limits is not abundant, but I have given reasons,* based on quick-run anemometer records, for believing that an ordinary wind of 30 miles an hour has enough turbulence to maintain in the air a bird—or a glider—whose angle of descent is 5°.

That birds use this method is, I think, extremely probable. As remarked on page 372 of the paper already quoted, "I have several times at Simla seen the air suddenly filled with scavenger vultures and kites when the only obvious cause was a sudden change in the weather that made the air very turbulent and gave exceptional facilities for gliding."

It may be added that in a similar manner an albatross maintains his pace by using the increase in wind velocity with height above the sea, gliding uphill against an increasing wind and downhill with a decreasing wind. Further details will be found in an article on "Flight" (natural) in the "Encyclopædia Britannica."

* Meteorology and the Non-Flapping Flight of Tropical Birds; Proc. Camb. Phil. Soc. XXI, pt. 4, pp. 367, P, 1923.

THE ROYAL AERONAUTICAL SOCIETY state that, in view of the performances in soaring flight which Herr Kronfeld is achieving in England, it may be of interest to note that they still have about 50 advance proofs of the lectures read by Dr. Georgii and Herr Stamer before the Society on February 19 last.

They will be pleased to send copies of the advance proofs on request to any readers who may not have had an opportunity of attending the lecture or reading the paper. The charge is 6*d*. per copy, or 7*d*. postage paid.

THE SAIL-PLANE CLUB OF THE T.M.A.C.—A general meeting has been held, and officers elected, who were authorised to proceed immediately.

The subscription has been decided as follows:—£5 5*s*. per annum and £2 2*s*. entrance fee; non-active membership, £1 1*s*. per annum.

Founder members are exempt from entrance fees, but the number of founder members is limited to 40.

All applications must be received before August 1, 1930.

A limited number of juniors are eligible for graduate membership. This entitles them to practical and theoretical instruction in the construction of gliders and sail-planes, subscription to above being 10*s*. 6*d*. per annum.

Grounds have been found and final arrangements regarding their rental are now being carried out.

Applications for membership should be made as early as possible and addressed to the Hon. Secretary, John Welding, 404, King's Road, Chelsea.

HALTON AERO CLUB. It is hoped that a visit to the club by Herr Kronfeld, the world's record holder for soaring flights, will be arranged in the near future.

He would inspect the land in the vicinity for suitable gliding and soaring grounds and would give a lecture with lantern slides.

THE DICKSON GLIDER.—We have now been able to make arrangements for the distribution of complete sets of working drawings in the form of blue prints for the Dickson Glider. These will be ready for distribution in the next few days, and we shall be glad to hear from those clubs who wish to have sets sent them. The price will be 30*s*. the set. These have been very carefully prepared for us by the Cloudcraft Glider Co. and are in great detail, so that those who are building their own gliders will find no difficulty in working to these drawings. All glider clubs have to start their operations with such a glider as this, and it should greatly add to the interest members have in the work of the club if they construct their own machine.

THE BRITISH GLIDING ASSOCIATION

President: AIR VICE-MARSHAL SIR SEFTON BRANCKER, K.C.B., A.F.C. *Hon. Sec.*: L. HOWARD FLANDERS, A.F.R.Ae.S., M.I.Ae.E,, A.M.I.Mech.E.

THE annual general meeting was held on June 12, and the following are the rules :—

Rules : OBJECTS.—1. The objects of the British Gliding Association (hereinafter called " the Association ") are to promote, encourage and control gliding in all its forms in Great Britain and Northern Ireland. (For the purpose of these rules the term " glider " means any heavier-than-air machine which does not depend on an engine for sustained flight.)

NAME.—2. The Association shall be called "The BRITISH GLIDING ASSOCIATION."

MEMBERSHIP.—3. The membership of the Association shall be composed of organisations formed for the promotion of Gliding in Great Britain (hereinafter called " Affiliated organisations "), Founder Members, Ordinary Members, Honorary Members, Life Members and Ex-officio Members.

ELECTION OF MEMBERS.—4. All candidates must be approved by the Council. If any member contravenes the rules governing airworthiness, or sporting contests, or shall have been convicted of an indictable offence, or shall have been adjudged a bankrupt, or shall go into liquidation, or being a Club shall cease to have more than 25 members, such member shall be struck off the roll of members by the Council, but may be reinstated on such terms as the Council may see fit to impose.

OFFICERS.—5. The Officers of the Association shall consist of a President, Vice-Presidents, Chairman and Treasurer, and such other Officers as the Association shall from time to time appoint. The Officers shall be ex-officio members of the Council.

ELECTION OF OFFICERS.—6. The Officers of the Association shall be elected by the Council each year for one year.

7. The Chairman and Treasurer shall not be eligible for re-election to their respective offices for one year after having served therein three consecutive years.

COUNCIL.—8. The Association shall be governed by a Council consisting of :

(*a*) Duly elected representatives from each affiliated organisation.

(*b*) Representatives, duly elected by ballot at the Annual General Meeting, of Founder Members, Ordinary Members, and Life Members of the Association.

(*c*) One representative of each of the following bodies—the Royal Aero Club, the Royal Aeronautical Society, Royal Meteorological Society, Society of British Aircraft Constructors, and Guild of Air Pilots and Air Navigators of the British Empire, duly nominated by those bodies.

(*d*) Ex-officio members and such other persons as the Council deem fit to co-opt. All Members of the Council shall retire annually.

9. Six of the members of the Council shall constitute a quorum.

ELECTION OF COUNCIL.—10. Representatives of :

Class (*a*) Shall be elected by secret ballot of each of the Organisations concerned. An affiliated Organisation shall be entitled to elect one representative on affiliation and one representative for each 100 members thereafter.

Class (*b*) Shall be elected by secret ballot confined to members of Class (*b*) and Class (*b*) shall be entitled to ten seats on the Council. Provided that if the number of members of Class (*b*) fall below 50, they shall be entitled to one seat for every five members.

Ballots.—ALL ballots shall be conducted by post and shall be in the following manner and the rules of the affiliated organisation should so provide.

Nominations, which must be signed by two members and the Candidate himself, must be received by the Secretaries at least 28 days before the General Meeting.

No discrimination other than the number of effective and possible attendances shall be made between new and old Candidates.

All ballot papers shall be returned to the Auditors of the Association at least seven days before the Annual General Meeting, who will compile and announce the result.

The results of the ballots will be circulated to the retiring Council before its last Meeting.

11. The Council may, by a resolution carried by a two-thirds majority of those present at a Special Meeting of the Council, called for the purpose at twenty-one days' notice, remove any member of the Council (including an ex-officio member thereof) from his post and appoint a successor, who shall retire as if appointed at the same time as the person he has succeeded, being eligible for re-election.

12. The Association may by a resolution carried by a two-thirds majority of those present in person or by proxy at a Special General Meeting of the Association, called for the purpose at twenty-one days' notice, alter, revoke or add to their rules.

ANNUAL GENERAL MEETING.—13. A meeting, to be known as " The Annual General Meeting," shall be held in February of each year at a suitable time and date and at some place chosen by the Council for the time being in office.

14. The persons entitled to vote at Annual or Special General Meetings shall be duly elected representatives of Class (*a*), all members of Class (*b*) and representatives of Classes (*c*) and (*d*).

POWERS.—15. The Council may appoint such Committees as it may deem advisable and may delegate to them such duties as it may think fit. Such Committees may include persons who are not members of the Council, but the Chairman who shall be appointed to each Committee shall be a member of the Council.

16. The Association may own, operate or hire such gliders, sail-planes, hangars, aerodromes and the like as may in the opinion of the Council be advisable or necessary.

AFFILIATION RULES.—1. Any organisation formed for the promotion of gliding in Great Britain may apply for affiliation to the British Gliding Association.

2. Affiliated organisations shall pay to the British Gliding Association such subscriptions and fees as the Council shall from time to time decide.

3. Membership of one affiliated organisation shall not constitute membership of other affiliated organisations, or of the Association itself.

4. All affiliated organisations shall be bound by the regulations passed at a General Meeting of the Association, or by resolutions of the Council.

5. Each affiliated organisation shall deposit with the Secretary of the Association two copies of its rules and regulations, and shall notify the Association of any alterations, amendments, or additions thereto. A limited company shall supply copies of its Memorandum and Articles.

6. Members of the Association shall be admitted as spectators at all public meetings of affiliated organisations without charge.

7. In the event of any affiliated organisation going into liquidation or being a club ceasing to have more than twenty-five members, all properties which that organisation may have received from the Association shall be returned to the Association.

8. The affiliated organisation shall not pledge the credit of the Association, or enter into contracts on behalf of the Association.

9. In the event of any dispute arising between the Association and an affiliated organisation, the matter may be referred for settlement to the Council of the Association.

10. The rules of affiliated organisations shall be drawn up consistent with and in accordance with the rules of the Association.

◈ ◈ ◈ ◈

CROYDON WEEKLY NOTES

ALTHOUGH the Whitsun rush is over, it is far from " all quiet " on the Tarmac, with this intensive " all round the clock " flying. Nothing out of the ordinary has occurred this week, but everything has been running smoothly at full bore. For a change, we have had lovely weather this side of the " ditch," whilst it has been *mauvais temps* on the Continent, causing delay and interruption to several services.

With all due deference to some of our daily papers, who refer to the new London, Birmingham, Manchester, Liverpool, air lines as the first inland air services, we would remind them of Daimler Airways, who ran a regular service to Manchester about seven years ago.

Starting on Monday, June 16, Imperial Airways will try out a thrice-weekly service connecting these cities with the Continental machines at Croydon, where there will be an interval of a few minutes only for passengers to pass through customs and immigration formalities. The proposed services will be : outwards, Mondays, Wednesdays, and Fridays ; inwards, Tuesdays, Thursdays, and Saturdays—bringing Croydon within 1 hr. 20 min. of Birmingham, 2 hr. 15 min. of Manchester, and 2 hr. 40 minutes of Liverpool.

It is understood that the service will be inaugurated by that well-known and famous pilot, our old friend Capt. O. P. (Off Prompt—which may be an allusion to both his operatic predilections and record for getting away to time) Jones, who will take the air on an Argosy. How one deeply rejoices to see multi-engined aircraft on the route this time.

The Walcot Air Line, Ltd., with their " all metal four-seater enclosed luxurious limousine " monoplanes, are extremely busy, having completed over 20 trips on the Croydon-Berck line during the short time the company has been in existence, and the last time one saw Maj. " Nobbie " Clarke he was making preparations for a flight to Biarritz.

Much overhauling and tuning up of engines for the King's Cup is going on in the A.D.C. sheds, where a number of competitors may be discovered with wet towels round their heads, feverishly working out courses, with the aid of slide rules, C.D.C.'s, Norie's Tables, and nautical almanacs.

Those three Marconi wizards, Messrs. Whistlecroft, Sayers and " Blossom " Huggins, amongst other activities, are carrying out ground tests on 5 to 6-m. wave, low-power sets, which they hope to apply to the air in the near future.

Apropos of the claims of several wireless firms to have had the first machine fitted up for wireless experimental purposes, one can remember such an aircraft belonging to the Marconi firm back in 1921—a D.H. 6 G-EAAB—the second civil aeroplane to be registered. Then followed a Reno Avro G-EBAJ and Bristol Fighter G-EBIO, to say nothing of the special machines which are chartered from time to time.

Herr Wolf Hirth, the well-known German racing motor-cyclist and winner of the Hindenberg Cup, 1929, accompanied by Herr Oskar Weller (no relation to " Sam "), came floating in on Sunday on a Klemm L.25 I 40-50 h.p. Salmson. They left Essen at 8.30 a.m. and arrived here 1.5 p.m. Repeating their last year's programme, they are flying to the Isle of Man to see the Tourist Trophy race, after which they will fly home via Paris, hoping to return to England for an extensive flying tour in a few weeks' time.

No less than 1,455 passengers and 65 tons of freight were carried this week.

Surrey Flying Services have had three joy-riding machines constantly in commission over the week-end, during which period they carried over 1,000 passengers, in addition to which 20 pupils are under dual instruction on the Avian, and their D.H.9 is kept busy on Continental work.

MODELS

THE MODEL AIRCRAFT CLUB (T.M.A.C.)

THE Club was not favoured with ideal flying weather for the June Handicap Competitions at Wimbledon Common on Saturday, June 7. A gusty wind prevailed throughout the afternoon and evening. The launching of models was always a risky process, but nevertheless, the flying was interesting to watch.

The models performed loops, rolls and sideslips, in fact aerobatics seemed the order of the day, some of the models making remarkable recoveries when a crash seemed inevitable. There were crashes, but these were few, most of the competitors completed the flights in the competitions.

Owing to the weather conditions, the durations were not generally high, but the efforts were none the less praiseworthy. The outstanding flights were those of W. Davis, 61 sec., and A. T. Willis, 65 sec., both of which secured a prize in the heavyweight competition.

Dr. Harrison flew a very interesting fuselage monoplane, the clean design of this machine was generally admired, and it seemed very stable in the air. Messrs. Shill, Jope, Wilkinson and Horne had new models, all of which showed admirable qualities, the latter being a compressed air model, but unfortunately, owing to the rough weather, he was unable to put it through its trials.

Will members take special note of the following:—

All members of the T.M.A.C. can enter for the Farrow Shield. It is hoped that all members will make a special effort to be present in order to compete. If there are any members desirous of going by road, a motor coach will be hired, providing there are enough members to fill it. Hon. Secretary: A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

Rules for Farrow Shield Inter-Club Contests

1. The Farrow Shield remains the property of the S.M.A.E.
2. Contest for the Farrow Shield to be held annually, between the S.M.A.E. and affiliated clubs or societies.
3. Each Club or Society can enter any number of competitors.
4. The models to be both fuselage and spar types and an equal number of each, as far as possible, from each club, but there must not be more spar models than fuselage models from any club.
5. All models shall be hand launched.
6. The best durations of the three leading fuselage models and the best durations of the three leading spar models of each club to count. The durations added will give the number of points scored.
7. Competitors will be allowed three flights each at the discretion of the judges, the best one only to count.
8. No competitor may make a test flight during the competition except by permission of the judges.
9. These rules are open to be supplemented or altered at any time at the discretion of the Council of the S.M.A.E.

Prizes.—The winning Club or Society to hold the Farrow Shield for one year. Three silver and three bronze medals will be awarded to the highest scorers of the winning team.

This competition will be held at Halton Camp, in conjunction with the Wakefield Cup Competition, on Saturday, July 19, 1930.

ACROSS COUNTRY! Mr. A. T. Willis's model making its record cross-country flight (Wimbledon Common—Southfields) on March 30 last (*see* FLIGHT, *April* 25, *p.* 470.)

The "Wakefield" International Cup

The eliminating trials for the above International Competition will be held on Wimbledon Common next Saturday, June 21, at 3.30 p.m. These trials are open to all, and the team of six to represent Great Britain in the actual competition will be chosen by the "S.M.A.E." judges.

The competition for the "Wakefield" International Cup will be flown at Halton Aerodrome, Bucks, on Saturday, July 19, at 4.15 p.m. This date coincides with Parents' Day at Halton Camp, and there will be special train facilities from Baker Street Station to Wendover, and an augmented bus service will be run from Wendover Station to Halton Camp.—S. G. Mullins, Hon. Sec., 72, Westminster Avenue, Thornton Heath, Surrey.

◈ ◈ ◈ ◈

Air Post Exhibition

A VERY interesting exhibition of air mail stamps and covers, organised by Messrs. H. R. Harmer and R. E. R. Dalwich, was opened at the Old Bond Street Galleries on June 10. Many very rare and historic items were included in the exhibit, from the balloon and pigeon post of the Siege of Paris (1870) to the present day.

New Compass for Light Aeroplanes

AN interesting light aeroplane compass has just been introduced to this country by E. F. Stephen, of 141, Bond Street, who will be the sole concessionnaire for this country. Known as the "ZN" Compass, the German makers, Zürn, Jackenkroll and Co., claim for it that it is a definite improvement on existing compasses in that it is non-periodic rather than aperiodic. That is to say, by careful design it has been possible to make the value of the magnetic moment so large in proportion to the amount of inertia that only a comparatively small amount of damping is necessary to eliminate oscillation. As a result the indication of the compass, although steady, is unusually rapid. For instance, the makers claim that, after a displacement of 45° the compass card will show a steady bearing in less than 5 seconds. By the use of Elektron it has been possible to reduce the weight to eleven ounces. Selling at ten guineas complete, this is the lowest-priced light aeroplane compass on the market, and should meet the needs of private fliers for a light, inexpensive compass, which is nevertheless reliable. There is also a Mark II model costing £1 extra, which is sold fitted recessed into an aluminium panel, which can be screwed into the dash, the whole making a very neat and inconspicuous fitting. The concessionnaire will send a folder describing the compass on request.

"ROTARY THUMBS"

Dr. A. P. Thurston's Novel Way of Imitating Birds' Wings

IN our issue of May 2 we recorded briefly that Dr. A. P. Thurston has been carrying our experiments with a new form of auxiliary aerofoil, having been led to his discovery by carefully watching, during a long period of years, the behaviour of certain birds. It may be recalled that already before the war Dr. Thurston was experimenting with auxiliary aerofoils, or as he then termed them, "riders," in front of the main wing. Some results of wind tunnel tests carried out by Dr. Thurston at East London College were published in FLIGHT of November 20, 1914. Since then Dr. Thurston has continued to experiment, and has extended his study of bird flight.

"ROTARY THUMBS": Sketch of a machine flying at a large angle of incidence and with the small propellers rotating.

By carefully watching birds, photographing them and so on, Dr. Thurston has discovered that certain birds make extensive use of a small wing situated in front of the main wing and hinged to it. This small wing is actually the bird's thumb, and is employed by the bird in getting extra lift when the main wing is about to "stall."

Following somewhat the reasoning which led early engineers to adopt wheels for vehicles instead of trying to imitate the complicated mechanism of legs, Dr. Thurston has evolved a form of rider plane or alula which he has called the "rotary thumb," it being, in fact, a small rider 'plane shaped very much like the normal airscrew, and supported on a spindle carried on the leading edge of the main wing of an aircraft. The general arrangement is illustrated by one of the sketches.

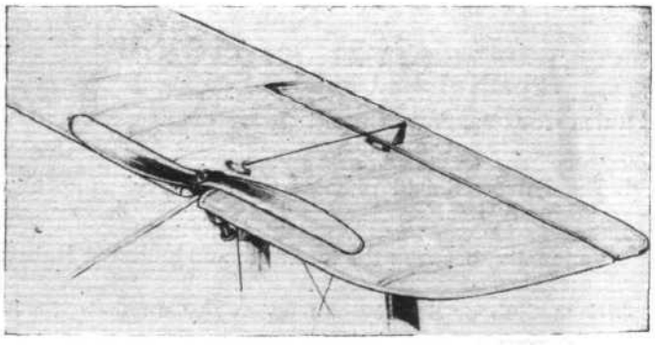
When the aircraft is in normal unstalled flight, the "rotary" thumb" nests down snugly on the leading edge of the wing. The spindle on which the thumb rotates is, by the way, inclined forward from the chord line of the wing. When the aircraft attains a large angle of incidence, such as when flying at or near its minimum flying speed, the spindle of the "rotary thumb" becomes inclined backwards slightly. The air striking the leading edge of the wing then lifts the "rotary thumb" away from its seat on the leading edge, and as soon as it is exposed to the wind stream the thumb lifts on its spindle until it has reached the limit of its upward travel and begins to rotate.

In the sketch the "rotary thumb" is actually slightly wrongly represented. The little propeller should have been of "opposite pitch," as it has been found that the greatest effect is obtained if the direction of rotation is such that the outer blade moves forward.

Concerning the action of the "rotary thumb," there is probably still much to be discovered. That the action is strongly similar to the action of the Handley-Page automatic slot seems evident. Stalling is avoided by preventing the air from breaking away from the aerofoil until a much larger angle than normal has been attained. We believe that Dr. Thurston claims that the "rotary thumb" gives a much more intense effect than the slot, due, it is thought, to the fact that in place of a stationary rider 'plane or auxiliary aerofoil, we have here an aerodynamic surface rotating at high speed.

It is too early yet to express an opinion of the merits or otherwise of the "rotary thumb." Dr. Thurston's experiments so far do definitely appear to indicate the attainment of very high lift and the avoidance of stalling even at very large angles. To how great an extent the drag of a wing fitted with "rotary thumbs" is affected is not at the moment known. On the face of it one would expect the increase in drag to be rather greater than that due to the snugly-housed auxiliary aerofoil, since a propeller shape cannot, presumably, be made to conform quite so closely to the contour of the main wing. But if the action of the "rotary thumb" is, as claimed, more intense, a slight increase in drag might not be too high a price to pay.

That there may be certain mechanical difficulties to be overcome before the new invention can be said to have proved itself is not unlikely. But in the meantime the scheme is one of considerable interest, and further developments should be worth watching.



A small propeller mounted on the leading edge forms a "rotary thumb." Dr. Thurston points out that to get the best results the propeller should have been of opposite pitch.

LORD THOMSON ON AVIATION IN ASIA

LORD THOMSON, Secretary of State for Air, speaking at the Anniversary Meeting of the Central Asian Society on June 11, said that British aviation was non-existent in Central Asia and was confined to the fringes, the northern frontier of India, and in Arabia with the activities of the R.A.F. and Imperial Airways, Ltd. At present the air services in operation between Europe and Asia included the British air mail to India and the French service to Beirut. Dutch, French and German lines contemplated services to Baghdad, while in Persia the Junkers firm had played a leading part in the development of civil aviation, and four air routes radiated from Teheran to Pahlevi, Meshed, through Shiraz to Bushire, and through Hamadan to Baghdad. He added that Russia, which formed the link between Europe and Asia, was making great strides in aviation. There was a service every weekday from London through Berlin, Moscow, and Sochi on the Black Sea to Baku, thence weekly to Teheran, and from there twice weekly to Bushire, the journey occupying 61 hr. 50 min. actual flying time.

Russia now had aviation centres at Tashkent, Samarkand, Termes, Kabul, Lake Aval, Khiva, Charjui, Semipalatinsk, Sergiopol, Alma-ata, the most important link being between Moscow and Tashkent, which gave her access to the whole northern frontier of Afghanistan, and to Mongolia.

Three new air lines had been added to the Russian network this summer and had increased the total length of airways in Russia from 7,438 miles to 11,445 miles. New lines planned for the next three years would raise the total length of the airways to 25,955 miles.

Germany was largely interested in Russian developments, and if friendly relations could be established with Russia it was possible that a joint arrangement would be made for the operation of the route from Moscow to Irkutsk, Urga, Peking, Nanking, and Shanghai.

France was planning to fly in co-operation with the British and the Dutch to Rangoon and thence to Bangkok and Saigon, and also to Hanoi and on to Canton. Chinese lines were being worked between Nanking and Shanghai, and also between Hankow and Shanghai, with the assistance of an American company. A line from Canton through Hankow to Peking was planned. Japan had started one line from Tokyo through Osaka to Dairen, in Manchuria, so far, with poor results.

THE ROYAL AIR FORCE

London Gazette, June 10, 1930.

General Duties Branch.

Wing Commander G. B. Dacre, D.S.O., is granted acting rank of Group Captain whilst seconded as Adviser to Greek Ministry of Aviation. Flying Officer D. M. Rees, M.B.E., is placed on retired list, and is granted permission to retain rank of Flight Lt. (June 6). Flight Lt. J. Bullock is placed on retired list (June 8). Flying Officer A. V. Harvey is transferred to Reserve Class A. (May 7) (substituted for *Gazette*, May 13). The short service commn. of Pilot Officer on probation N. S. Lesmere is terminated on cessation of duty (June 6).

Accountant Branch.

The follg. are granted permanent commns. as Pilot Officers on probation with effect from and with seniority of June 2 :—D. Lumgair (Lt. Cheshire Regt., T.A.), C. G. Sharp, C. A. Proffitt, P. Griffiths, R. Peel, J. G. Wigley, W. J. R. Cann, R. F. Fleming.

Medical Branch.

H. R. Clein, M.B., B.Ch., is granted a short service commn. as Flying Officer for three years on active list, with effect from and with seniority of March 31 ; Flight Lt. R. Boog-Watson, M.B., Ch.B., D.P.H., is promoted to rank of Squadron Leader (June 7) ; Flight Lt. (Quartermaster) H. Steele is promoted to rank of Squadron Leader (Quartermaster) (June 5).

Chaplains' Branch.

The Rev. J. H. P. Still, M.A., is promoted to relative rank of Wing Commander (May 24).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

Flying Officer L. A. Lewis is transferred from Class C to Class A (May 19) ; Flight Lt. D. G. Allison is transferred from Special Reserve to Reserve, Class C (May 30).

ROYAL AIR FORCE INTELLIGENCE

Appointments—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain J. B. Bowen, O.B.E., to R.A.F. Depot, Uxbridge. Supernumerary, on transfer to Home Establ, 10.5.30.

Squadron Leaders : L. F. Forbes, M.C., to No. 4 Flying Training School, Egypt, 19.5.30. N. W. Wadham, to H.Q., Fighting Area, Uxbridge, 27.5.30. P. G. Scott, to H.Q., R.A.F., Cranwell, 9.6.30.

Flight Lieutenants : G. L. Gandy, to No. 70 Sqdn., Iraq., 30.4.30. R. M. Foster, D.F.C., to R.A.F. Depot, Uxbridge, 29.4.30. C. F. Toogood, to No. 9 Sqdn., Manston, 2.5.30. W. A. Tattersall, to H.Q., Inland Area, Stanmore, 1.6.30. D. H. Carey, to No. 99 Sqdn., Upper Heyford, 15.6.30. E. S. Borthwick-Clarke, to No. 17 Sqdn., Upavon, 30.4.30. M. H. Ely, to No. 209 Sqdn., Mount Batten, 2.6.30. J. C. E. A. Johnson, to R.A.F. Depot, Aboukir, 29.5.30.

Flying Officers : E. A. Swiss, to R.A.F. Base, Gosport, 3.6.30. J. D. H. Slade, to No. 462 Flight, 3.6.30. H. C. Parker, to No. 448 (Fleet Spotter Reconnaissance) Flight, 4.6.30. J. P. Domvile, to H.Q., R.A.F., Transjordan and Palestine, 31.5.30. V. J. Sofiano, to H.Q., R.A.F., Transjordan and Palestine, 6.6.30. C. E. V. L'E. Feasey, to R.A.F. Practice Camp, Sutton Bridge, 2.6.30.

Pilot Officer G. R. Warner, to No. 16 Sqdn., Old Sarum, 4.6.30.

Stores Branch.

Flight Lieutenants : H. T. H. Copeland, to Base Supply Depot, Iraq, 16.4.30. W. St. J. Littlewood, to Central Supply Depot, Iraq, 27.4.30.

Flying Officers : C. Thripp, to H.Q., R.A.F., Cranwell, 2.6.30. C. I. Fry, to Aircraft Depot, Iraq, 20.5.30.

Accountant Branch.

Wing Commander P. J. Wiseman, to Station H.Q., Manston, 2.6.30.

Squadron Leader T. C. Miller, M.C., to Aeroplane and Armament Experimental Establ, Martlesham Heath, 2.6.30.

Flying Officers : S. C. George, to Station H.Q., Heliopolis, 26.5.30. J. MacL. Murray, to No. 47 Sqdn., Khartoum, 26.5.30.

Medical Branch.

Flight Lieutenants : G. E. Church, to Princess Mary's R.A.F. Hospital, Halton, 20.6.30. J. Hill, to Princess Mary's R.A.F. Hospital, Halton, 28.6.30.

Flying Officer G. O. Williams, to Station H.Q., Kenley, 30.6.30.

RESERVE OF AIR FORCE OFFICERS

Flight Lieutenant T. M. Walker (Medical), to Station H.Q., Bicester, on being employed with the Regular Air Force, 2.6.30.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty :

Lieut. F/O., R.A.F.—M. T. Cowin, to *Victory* (May 26).

◈ ◈ ◈ ◈

R.A.F. SPORT

RIFLE SHOOTING AT BISLEY

WHITELOCK CUP (Young Officers' and Airmen's Championship) ; Queen Mary conditions ; h.p.s., 200 points.—1, F/O. R. Harstan, Old Sarum, 159 ; 2, Cpl. Hancock, Andover, 156 ; 3, Cpl. C. Sexton, Henlow, 156 ; 4, A.C. W. E. Lynch, Andover, 155 ; 5, A.C. H. R. Herring, 155 ; 6, L.A.C. Hall, Cranwell, 153 ; 7, L.A.C. J. McLaughlin, Andover, 152 ; 8, L.A.C. F. Penfound, Gosport, 151 ; 9, A C. D. Paul, Eastchurch, 150 ; 10, L.A.C. Holloway, Calshot, 150.

BARTON REVOLVER CHAMPIONSHIP CUP.—Two Whitehead practices.—1, Flight-Lieut. C. W. Hill, Henlow, 199 ; 2, Flight-Lieut. G. H. Stainforth, Uxbridge, 177 ; 3, Flight-Sgt. A. Worden, Wittering, 176 ; 4, Group-Capt. R. J. F. Barton, Netheravon, 169 ; 5, Cpl. C. Willott, Eastchurch, 168 ; 7, Sgt. Miller, Aldergrove, 158 ; 8, Flight-Sgt. F. Ford, Halton, 155.

PISTOL CHAMPIONSHIPS.—Salmond Team Cup.—1, Netheravon, 209 ; 2, Eastchurch, 204 ; 3, C. F. S. Wittering, 199. F. C. Halahan Individual Cup.—1 (after tie shoot), Cpl. C. Willott, Eastchurch, 67 ; 2, Flight-Sgt. A. Worden, Wittering, 67 ; 3, Sgt. Clark, Netheravon, 59 ; 4, Sgt. Miller, Aldergrove, 59 ; 5, Flight-Lieut. C. W. Hill, Henlow, 59 ; 6, Flight-Lieut. G. H. Stainforth, Uxbridge, 58 ; 7, Group-Capt. R. J. F. Barton, Netheravon, 57 ; 8, Sqdn.-Ldr. T. S. Ivens, Andover, 56.

COMMAND CHALLENGE CUP.—S.R.a. ; teams of eight ; 10 rds. slow at 600 yds. ; 10 rds. rapid at 500 yds. ; 10 rds. rapid and 10 rds. snap at 300 yds. ; h.p.s., 1,600 pts. Holders, Inland Area.

1, Inland Area, Cpl. C. Willott, 167 ; Flight-Sgt. J. Burton, 166 ; Flight-Lieut. C. W. Hill, 166 ; Flight-Sgt. B. Crane, 152 ; A. C. Paul, 145 ; Cpl. P. Spooner, 141 ; Flight-Sgt. A. Worden, 140 ; Flying-Off. R. Harston, 126—total, 1,203 ; 2, Iraq, 1,120 ; 3, Coastal Area, 1,111 ; 4, India, 1,102 ; 5, Middle East, 1,091 ; 6, Wessex Bombing Area, 1,088 ; 7, Halton, 1,018 ; 8, Fighting Area, 996 ; 9, Cranwell, 894 ; 10, Aden, 823.

PAST AND PRESENT MATCH.—S.R.b. ; teams of eight ; King's second-stage conditions ; h.p.s., 1,200 pts.

1, Past Members.—Sqdn.-Ldr. J. L. K. Pearce, 142 ; Lieut. Roger Riley, 139 ; Cpl. E. A. Reynolds, 138 ; Lieut. G. F. Booth, 138 ; Capt. E. H. Robinson (G.M.), 136 ; Flight-Lieut. C. E. Cullen, 136 ; Lieut. G. Richardson (S.M.), 134 ; Flight-Lieut. A. E. Dark, 124 ; total, 1,087.

2. Serving Members.—A.C. D. Paul, 140 ; Cpl. C. Sexton, 139 ; Cpl. C. Willott, 137 ; L.A.C. W. Hall, 133 ; Flight-Lieut. G. H. Stainforth, 133 ; Flight-Sgt. A. Worden, 133 ; Flight-Lieut. C. W. Hill, 131 ; Wing-Cmdr. A. T. Whitelock, 130 ; total, 1.076.

Individual Medals.—1, Sqdn.-Ldr. J. L. K. Pearce ; 2, Lieut. Roger Riley ; 3, Cpl. E. A. Reynolds.

J. C. HALAHAN CUP.—S.R.b. ; King's second-stage conditions ; h.p.s., 150 pts.—1 (after tie shoot), A.C. D. Paul, Eastchurch, 140 ; 2, Sgt. D. Edwards, Gosport, 140 ; 3, F/O. H. H. Ellison, Aldergrove, 139 ; 4, Cpl. C. Sexton, Henlow, 139 ; 5, Flight-Sgt. B. Crane, Wittering, 138 ; 6, Cpl. C. Willott, Eastchurch, 137 ; 7, Flight-Sgt. F. H. Ford, Halton, 135 ; 8, A.C. E. King, Air Ministry, 135 ; 9, Sqdn.-Ldr. S. S. Benson, Andover, 134 ; 10, L.A.C. W. Hall, Cranwell, 133 ; 11, Flight-Lieut. G. H. Stainforth, Uxbridge, 133 ; 12, Flight-Sgt. A. Worden, Wittering, 133 ; 13, Cpl. P. Spooner, Manston, 133 ; 14, L.A.C. R. Bennett, Eastchurch, 132 ; 15, Group-Capt. L. W. B. Rees, V.C., West Drayton, 132 ; 16, Flight-Lieut. C. W. Hill, Henlow, 131 ; 17, Pilot-Officer J. E. C. McClure, Netheravon, 131 ; 18, Sgt.-Maj. E. J. Knight, West Drayton, 131 ; 19, Flight-Lieut. E. R. C. Hobson, Air Ministry, 131 ; 20, Wing-Comdr. A. T. Whitelock, Upper Hayford, 130.

CRICKET

R.M.A. *v.* R.A.F. COLLEGE, CRANWELL

At Woolwich on Thursday, June 5, the R.M.A. beat the R.A.F. College, Cranwell, by 202 runs. Score :—

ROYAL MILITARY ACADEMY

First Innings		*Second Innings*	
W. A. R. Sumner, c. and b. Pearce	27	c. Bader, b. Ling	19
M. St. G. Oswald, l.-b.-w., b. Field	19	c. Moorby, b. Ling	3
W. T. Lawson, c. Emson, b. Pearce	1	c. Ling, b. Field	1
G. R. T. Gillett, l.-b.-w., b. Ling	66	l.-b.-w., b. Ling	11
C. V. Hodgson, c. Doran, b. Ling	34	c. Doran, b. Ling	29
P. T. O'B. Butler, b. Ling	0	l.-b.-w., b. Messenger	5
J. Sheffield, c. Emson, b. Bader	12	c. Moorby, b. Pretty	56
L. J. Harris, not out	0	st. Emson, b. Pretty	9
T. H. Hardy, c. and b. Ling	1	c. Doran, b. Ling	15
C. E. Dumbell, b. Ling	0	run out	0
H. M. H. Ley, b. Ling	0	not out	15
Extras	6	Extras	11
Total	166	Total	174

R.A.F., CRANWELL

First Innings		*Second Innings*	
W. Ling, b. Hodgson	4	b. Hodgson	3
A. Emson, c. Butler, b. Hodgson	21	c. Sumner, b. Hardy	5
B. Pretty, c. Oswald, b. Hodgson	1	b. Hodgson	0
D. Bader, c. Sumner, b. Hardy	31	c. and b. Hodgson	3
G. Field, c. Ley, b. Hodgson	3	c. Harris, b. Hardy	3
E. Pearce, c. Butler, b. Hodgson	4	c. and b. Hodgson	1
L. Hogan, b. Dumbell	8	c. and b. Hodgson	0
F. Moorby, not out	23	b. Hodgson	5
H. Fawkes, c. Butler, b. Dumbell	4	l.-b.-w., b. Hardy	3
G. Messenger, b. Dumbell	1	not out	4
F. Doran, l.-b.-w., b. Hardy	5	b. Hodgson	0
Extras	4	Extras	2
Total	109	Total	29

COMPETITIONS AT OLYMPIA

BAYONET FIGHTING.—F./O. D. F. W. Atcherley won the R.A.F. Championship.

The Artists Rifles set up a new record by winning the Inter-Services Bayonet Team Championship. The Artists beat the R.A.F. by twelve to six and defeated the Royal Navy in the final by fourteen fights to four.

TUG OF WAR (110 st.) Royal Air Force Championship.—Royal Air Force, Uxbridge, beat Royal Air Force, Andover, by two pulls to nil. Times.—2 min. 8 sec ; 1 min. 32 sec.

FLYING AT EIGHTY-NINE: On May 29 one of the youngest old ladies in Yorkshire took her first flight at the remarkable age of 89! Mrs. Hartly, the old lady concerned (shown above), is great-aunt to the Blackburn brothers, Robert, Norman and Charles. She flew with Capt. Norman Blackburn in a "Bluebird" and thoroughly enjoyed it.

The Desoutter Mark II

THE new Desoutter monoplane to which we referred recently will, in all probability, have been completed by the time this week's issue of FLIGHT reaches our readers. The machine has been fitted with an inverted "Gipsy III" engine, and the various modifications of the machine have resulted in the appearance being considerably improved, while it is also hoped that the top speed will be rather better than that of the Mark I machine. The Mark II Desoutter monoplane will be available both with the inverted "Hermes" and with the "Gipsy III."

Airports in the West Indies

ATLANTIC AIRWAYS, LTD., have been requested by the Governor of Trinidad and the Governor of the Bahamas to advise on the selection and layout of civil airports in the West Indies, and Brig.-Gen. Francis Festing, C.B., C.M.G., the special representative of Atlantic Airways, Ltd., who has lately been in Canada and U.S.A., is now *en route* to Trinidad to carry out this work. Messrs. Garraway, Black and Co. are the managing agents of the company, and the registered offices are at 14, Avenue Chambers, Southampton Row, London, W.C.1.

F.A.I. and the late Compte de Vaulx.

THE closing session of the Federation Aeronautique Internationale was held on June 13 in Paris. It was decided not to elect a new president in place of the late Compte de Vaulx until next November. The F.A.I. adopted a suggestion by Senhor Santos Dumont that a gold medal bearing the name of the late president should be awarded each year to the most meritorious pilot of a commercial air line, and it was also decided to erect a memorial tablet to the Compte on the spot near Jersey City, U.S.A., where he was killed in a crash.

Mr. C. Ll. Bullock to be Secretary of the Air Ministry

THE Secretary of State for Air has appointed Mr. C. Ll. Bullock, C.B., C.B.E., to be Secretary of the Air Ministry in succession to Sir Walter Nicholson, when the latter vacates the appointment in the autumn.

Mr. Bullock has for the last seven years been principal private secretary to successive Secretaries of State for Air.

I.A.F. Medal for Costes

THE gold medal awarded by the International Aeronautical Federation for the most distinguished aviator of the year has been given to Dieudonné Costes. Dr. Eckener, Herr Kronfeld, the Spanish pilots Jimenez and Iglesias, and Admiral Byrd were other candidates.

Bomber Squadron Competition

THE result of the cross-country competition for day bombers held this spring, has now been published by the Air Ministry. The winning unit was No. 12 B.S. ("Fox"), and the next four in order of merit were No. 207 ("Fairey, III F"), No. 33 ("Hart"), No. 35 (III F), and No. 100 ("Horsley"). The results of the competition for night bombers are not yet available.

IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

For 1910 and 1911 figures see FLIGHT for January 25, 1912.
For 1912 and 1913, see FLIGHT for January 17, 1914.
For 1914, see FLIGHT for January 15, 1915, and so on yearly, the figures for 1927 being given in FLIGHT, January 17, 1930.

	Imports.		Exports.		Re-exports.	
	1929.	1930.	1929.	1930.	1929.	1930.
	£	£	£	£	£	£
Jan. ..	—	2	74,307	147,935	100	—
Feb. ..	6,532	2,460	195,369	226,049	2	1,000
Mar. ..	1,210	744	204,664	156,098	90	802
April ..	5,816	2,959	186,477	213,390	115	79
May ..	4,706	11,706	243,549	158,460	1,245	2,550
	21,116	20,856	904,366	901,932	1,552	4,431

PUBLICATIONS RECEIVED

Punch Summer Number, May 26, 1930. Punch Offices, Bouverie Street, London, E.C.4. Price 1*s.*

The Law of Aviation. By G. D. Nokes, LL.D., and H. P. Bridges, LL.D. *London*: Chapman and Hall, Ltd. Price 12*s.* 6*d.* net.

Aeronautical Research Committee Reports and Memoranda: *No.* 1285 (*M.* 66).—Mechanical Properties of Pure Magnesium and Certain Magnesium Alloys in the Wrought Condition (Continued). Mechanical Properties of "Electron" Alloy. By H. J. Tapsell, S. L. Archbutt and J. W. Jenkin, B.Sc. Price 9*d.* net.

NEW COMPANY REGISTERED

BRYTCAST STAINLESS METALS, LTD.—Capital £45,000, in 30,000 8 per cent. cumulative preference shares of £1 each and 300,000 ordinary shares of 1*s.* each. Acquiring the business of steel manufacturers and moulders as formerly carried on by Martin Industries, Ltd., at Nimmings Road, and Green Lane, Blackheath, near Birmingham, to acquire certain patents for inventions relating to the manufacture and moulding of steel, and also the trade name "Brytcast." Directors: C. Graham-White, Quayside, Cowes, I. of W.; engineer. W. E. Martin and E. F. C. Roberts. J. S. Critchley, 15, Waldegrave Road, Bickley, Kent, consulting engineer. Solicitors: Kenneth Brown Baker Baker, Essex House, Essex Street, Strand, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1929

Published June 19, 1930

5,447. VICKERS (AVIATION), LTD., and R. K. PIERSON. Stabilising-devices for pivoted aerofoils. (329,648.)
5,811. BRISTOL AEROPLANE CO., LTD., and H. J. POLLARD. Aircraft structures. (329,657.)
10,068. CENTRA-HANDELS-UND INDUSTRIE AKT.-GES. Cylinder blocks of radial-cylinder i.c. engines. (309,587.)
11,930. L. H. CROOK. Aerodynamic wing control. (329,783.)
13,546. V. J. BURNELLI. Aeroplanes. (329,809.)
13,975. C. LORENZ AKT.-GES. Apparatus for distinguishing the fairway. (329,812.)
21,205. H. JUNKERS. Governing of i.c. engines. (316,301.)
23,036. V. VALENTINSEN. Screw propellers. (329,903.)
23,972. E. LAUSCHBAUER. Steering-mechanism for flying machines. (329,904.)
27,849. J. ROCHE and W. P. VERDON. Fog-penetrating lights. (329,930.)

FLIGHT, *The Aircraft Engineer and Airships*
36, GREAT QUEEN STREET, KINGSWAY, W.C.2

Telephone: Editorial, Holborn 1884; Advertising, Holborn 3211.

Telegraphic address: Truditur, Westcent, London.

SUBSCRIPTION RATES POST FREE

UNITED KINGDOM.		UNITED STATES.		OTHER COUNTRIES.*	
	s. d.				*s. d.*
3 Months	7 7	3 Months	$2.6	3 Months	8 3
6 ,,	15 2	6 ,,	$4.12	6 ,,	16 6
12 ,,	30 4	12 ,,	$8.24	12 ,,	33 0

* *Foreign subscriptions must be remitted in British currency.*

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT" 36, Great Queen Street, Kingsway, W.C.2, *and crossed Westminster Bank.*

Should any difficulty be experienced in procuring "FLIGHT" *from local newsvendors intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*